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BRIEF NOTES

FOR

TEMPERANCE TEACHERS.

BY

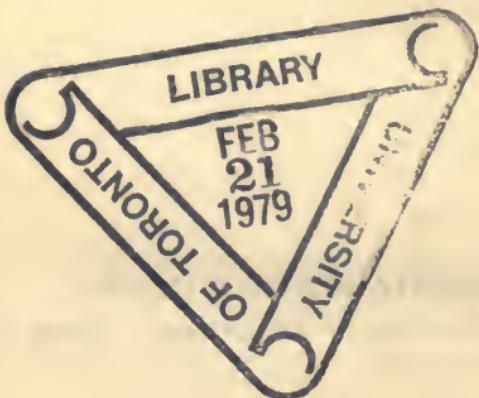
BENJAMIN WARD RICHARDSON, M.D., F.R.S.,

*Author of "The Temperance Lesson-Book," "Ten Lectures on Alcohol
Etc., Etc.*

MILWAUKEE, WISCONSIN:

Right Worthy Grand Lodge, Independent Order Good Templars,
B. F. PARKER, R. W. G. Secretary.

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TO

JOHN B. GOUGH,

**IN SINCEREST RECOGNITION AND ADMIRATION OF ONE OF THE MOST
SPLENDID OF HUMAN GIFTS,**

UNMATCHED ELOQUENCE;

SPLENDIDLY DEVOTED TO THE SERVICE OF MANKIND,

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P R E F A C E.

IT happens to me many times a month to receive an invitation to lecture on Temperance before some Society or Meeting.

Zealous for the progress of Temperance, I have done my best to meet these demands; but for long past have found myself unable fully to comply with them without a sacrifice of professional work I could not afford to make, to say nothing of the incessant strain incident to the labor.

In these "Brief Notes" I have put together such memoranda as I should take to the desk, were I about to teach, in the hope that they may be of some use to those who may wish to become Teachers.

The notes are suggestions rather than precepts, and are intended as much for school as for lecture classes. I do not expect any Teacher to be content with merely submitting them to the class. I anticipate that the Teacher will take the notes as guides; will enlarge on the points raised, as the lesson proceeds; and will fill up all the spaces from his own knowledge and experience.

BENJAMIN WARD RICHARDSON.

25 MANCHESTER SQUARE, W.

November, 1883.

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S U B J E C T I.

ON COMMON ALCOHOL AND THE ALCOHOL FAMILY.

INTRODUCTION.

In opening this Subject, commence by explaining that, in respect to alcoholic drinks, there is

A COMMON ERROR.

A most common error in respect to intoxicating drinks is, that each of such drinks is composed of a fluid which is the only thing of its kind, and which therefore stands out alone as a drink.

THE VIEW ERRONEOUS.

The view is entirely erroneous, and has sprung out of the primitive ideas of mankind respecting wines, beers, spirits, or other kinds of intoxicating fluids. It is well, therefore, to take a glance, historically, at the methods by which the world has become acquainted with the substance now called *Alcohol* which is present in intoxicating fluids, and at the origin of the term "Alcohol."

Explain that the Subject will be divided into three parts.

Part I. Descriptive of the way in which Alcohol was first obtained.

Part II. Alcohol in intoxicating drinks.

Part III. The Alcohol family.

PART I.

THE DISCOVERY OF ALCOHOL.

In this part we must first study

WINE.

In the earliest times the only strong or intoxicating drink that was known was what we now call wine. The Greeks called it *oinos*, the Romans called it *vinum*, the French, following the Romans, but dropping the last syllable, called, and still call it, *vin*. The Germans called and call it *wein*. We called and call it *wine*, changing the Latin "v" into "w," and adding the vowel "e" in place of the final letters *um*.

WHO DISCOVERED WINE?

Much learned controversy has taken place relating to the actual discovery of the process of wine-making. Egypt claims the invention for her god Osiris, and Rome for Saturn.

The Greeks, ambitious to be connected with the origin of wine, assert that the drink was first discovered in Ætolia by Orestheus, the son of Deucalion, whose grandson, Oeneus, was so called from *Oinos*, which was the old name of the vine. Or else the discovery was by Oeneus himself, who first pressed the rich grapes. Thus, *oinos*, *oinon*, *vinum*, *vin*, *wein*, *wine*.

[Here any further historical fact or illustration can be introduced.]

THE INVENTION LOCAL.

It is worthy of special remark that the invention of wine was local on the planet, and that it came from

some centre of the ancient world lying near to those points from whence our modern civilization took its rise. When that civilization concentrated itself into bands, or armies, or navies, for the purpose of discovering new portions of the earth, where other savage nations, as they are called, dwelt, it found the wine-god, the wine-cup, and the wine, equally unknown. A good three-quarters of the old world knew no more of wine than of the people who invented it, until they were taught to know it,—then they learned about it fast enough.

WINE DID NOT COME BY NECESSITY.

Wine, therefore, did not come to man as a necessity; it came as a luxury, and in that sense it still comes to every one; for every one is born a total abstainer from wine and every other kind of strong drink. Every one fails to be a drinker of strong drink until, by imitation or persuasion, he is tempted to make a trial of it; very many pass through the first fourth of their lives before they even commence the trial of it, and when they do commence, it is, confessedly, for pleasure or for luxury.

[Add any further information on this point.]

Then pass to consider the

ANCIENT USE OF WINE.

The ancients themselves deserve to be credited with much honor in respect to their views on the use of wine. They never pretended that the drink was required as a food for sustaining the health of the body. They never claimed that it was to be taken as a drink to quench thirst. They argued that it was to be taken

at the feast in order to cheer and enliven the mind. They very soon found out that it would never do to take wine in the same way as water is taken. One of the greatest of them, Solomon the Wise, said, emphatically, that "wine is a mocker." Another of them, the Greek philosopher, Demosthenes, said, "To drink deep is a property fit for a sponge, not for a man." Seneca, the Roman philosopher, taught that to suppose "it possible for a man to take much wine and retain a right frame of mind, is as bad as to argue that he may take poison and not die, or the juice of the poppy and not sleep."

WINE A LUXURY.

Wine, therefore, crept on to the tables of man as a luxury. It did not come to him as a necessity. He had everything in the way of drink that was necessary for him, put before him without any reference to wine. He lived for ages, probably without knowing anything about wine. Millions of men have lived during past ages without knowing anything about wine.

After any comment on above, pass to subject of

THE MAKING OF WINES AND STRONG DRINKS.

The first discoverers of wine squeezed the rich juice from the grapes, collected the fluid, and let it stand in the open air. By and by, usually in the course of a few hours, they observed a great change in the fluid. It underwent a commotion, and seemed as if it had been subjected to the action of heat. They said it fermented. Then when it was poured off it was found to be a fluid, very clear, and almost as varied in color as the fruit

from which it was expressed. Sometimes it was white, sometimes red, sometimes dark. Different grapes yielded different wines.

From subject of wine lead on to that of

FERMENTATION.

The change or commotion in grape juice which led to wine was called by the Latins fermentation (*ferveo*, to boil), but we have no true history of the steps leading to the discovery of fermentation. It was, probably, as almost all these processes are, quite an accidental discovery, and we may presume it was very simple. As fire is easily produced in nature when a metal, like iron, strikes upon a piece of flint, so fermentation of the juice of ripe fruit, or of fluids made by steeping corn or fruit in water, is easily, and, as it would seem, spontaneously, set up. Exposed to the air, the grape juice receives a something, thought by many to consist of living organisms, which are very active when they come into contact with these ripe-fruit juices, or with infusions containing fruit, or corn, or other vegetable substances. The grape juice or the infusion begins through this agency to undergo the change which is called *fermentation*.

PRODUCTS OF FERMENTATION.

Some men in the ancient world, not knowing the mode in which fermentation was brought about, learned, nevertheless, the steps of that process so as to carry it out practically. They discovered that when a fluid was fermenting there were four products as a result:

1. An air or fine invisible fume or vapor which came off in bubbles, and which, if a person breathed, soon

made him cold, dark-colored, and insensible,—a deadly vapor.

2. A froth which rose on the top of the fermenting juice or fluids, and which, being taken from the top and added to fresh juice or fluid, would kindle quickly a similar fermentation, and become itself multiplied.

3. At the bottom of all a mass of heavy, half-solid substance, which would separate from the liquid above, if the liquid were allowed to rest.

4. Beneath the froth or ferment that was skimmed off, a thin odorous fluid, of varied color and taste according to the nature of the fluid that was originally set to ferment.

The *first* of these products was a mephitic or poisonous air. The *second* was a fermenting agent. The *fourth* and *lowest* was dregs or lees. The *third*,—the fluid between the ferment and the lees,—was *wine*.

ARTIFICIAL FERMENTATION IN IMITATION OF NATURE.

The art of fermentation was gathered from the simplest observation of natural phenomena. Nature lighted up the fermentation in the fruit juice, and supplied the ferment. Man, imitating nature, not by making the ferment, but by adding ferment to fluid capable of fermenting, made such fluid undergo fermentation, and produced the intoxicating wine.

The subject of fermentation leads naturally to that of

DISTILLATION.

For many centuries after the discovery of wine, there was nothing known to mankind beyond the formation of vinous fluids by fermentation. At length a new

process was brought to bear, which, simple as it is to us now, was, in its early days, and for many long days afterward, a wonder and a mystery. This was the simple act of distilling or distillation.

Distillation was probably an imitation of nature, for nature is ever distilling and condensing. In the cold, water condenses on the leaf and on the grass, as dew. From the earth, under heat of the sun, water ascends, as vapor, to condense and to fall back in mountain rill or in rain.

The chemists at last learned how to do the same thing artificially, and by raising water into a state of vapor by heat, and condensing it by cold, obtained the simplest of the immediate imitations of nature. Then by easy transition they passed to other liquids, and with special ease to that liquid which has even rivalled water as a drink—wine.

Pass now to explain the origin of

SPIRIT OF WINE.

The discovery of spirit of wine, by distillation of wine, has been attributed to Albucasis or Casa, an Arabian alchemist and physician of the eleventh century.

INSTRUMENTS USED IN DISTILLATION.

In the earlier modes of distillation of wine the instruments used were simple but effective. They consisted of the furnace, the receptacle to the furnace, the receiver, which stood within the receptacle, and the alembic or condenser, which was made of tin or other metal.

[Opportunity offers here for any other points of history relating to the alchemists.]

Proceed in the next place to consider the

FIRST USES OF WINE SPIRIT.

The pure spirit of wine in its earlier use was applied mainly to chemical and medicinal purposes, and many centuries elapsed before the process of distillation became active for the production of those stronger drinks, which, under the name of "spirits," are now in such common use in daily life. Brandy, from *brennen*, to burn, and thus *Branntwein*, Brandy, is a comparatively late term in European literature. Gin, contracted from *Geneva*, is not to be found as signifying a spirituous drink in our vocabularies of two hundred years ago. The term rum is assigned to the native American peoples, who so designated the vinous spirit distilled from sugar. Whisky (Celtic, *usige*, water), though it has been very long known as a distilled drink, has not received its English name of Whisky longer probably than a century and a half.

[Add, if necessary, any further illustration here as to names of wines or other strong drinks.]

SUMMARY.

To sum up, there are four stages in the discovery of spirits of wine, now called Alcohol.

(a.) The stage of manufacture of wine or beer and other liquors by fermentation. This stage extends from the earliest history of the subject until the time of the alchemists, say to about the eleventh century of the Christian era.

(b.) A stage when there was distilled from wine a lighter spirit, called first, spirit of wine, and afterward Alcohol.

(c.) A stage when this subtile or distilled spirit from wine, was applied in its refined and pure state for the arts.

(d.) A comparatively modern stage, when the process of distillation was applied to the production of alcoholic drinks, for the use of man, under the names of Whisky, Brandy, Gin, and Rum.

[*This summary may be copied on to the blackboard with advantage.*]

THE TERM ALCOHOL.

A long time after spirit of wine had been discovered, the name Alcohol was applied to it. The word has now come into common use, and we speak almost always in these days, of *Alcohol*, of *alcoholic* drinks, and of *alcoholic* strengths of such drinks.

The origin of the word is believed to be from the Arabic. In the Cantor Lectures on Alcohol, it is stated that, "The first employment of the word Alcohol is obscurely recorded." Bartholomew Parr, one of the most learned of our scientific classics, taking the usual derivation of the word, as from the Arabic Al-ka-hol, a subtile essence, says:

"It was originally employed to designate an impalpable powder, used by the Eastern women to tinge the hair and the margin of the eyelids. As this powder, viz., an ore of lead, was impalpable, the same name was given to other subtile powders, and then to the spirit of wine, exalted to its highest purity and perfection."

The earliest systematic and truly scientific use of the term is in Nicholas Lemert's "Course of Chemistry," published in 1698. There the word is used as a verb "to alcoholize," and the definition of this is said to be "to reduce to Alcohol as when a mixture is beaten into

an impalpable powder." The word, says Lemert, is also used to express a very fine spirit, "thus the spirit of wine well rectified is called the Alcohol of wine."

The word employed in this sense, merely tells us of a light fluid substance obtained by a refined process of separation from a grosser substance. But it was not applied to the special fluid now under our consideration until long after that fluid had actually been separated. Then it was used as a supplementary term to the earlier terms, *Vinum adustum*, *Vinum ardens*, *Spiritus vini*, *Spiritus ardens*, by which a spirit obtained from the grosser fluid, by the action of fire, was known and described.

PART II.

ALCOHOL IN INTOXICATING DRINKS.

In wines and all strong drinks there is the substance, wine spirit or *Alcohol*.

There are other substances present, but the property of the drink for which it is taken, depends on the *spirit* it contains. The drink is called weak or strong according to the amount of the strong spirit that is present in it.

ESTIMATE OF ALCOHOL IN DIFFERENT DRINKS.

The amount of Alcohol or spirit in different drinks, is estimated by the weight, or by the measure or volume of it that is present in them.

Alcohol in its pure state is called *absolute Alcohol*; with an equal part of water, by weight, it is *proof Alcohol* or *proof spirit*.

PERCENTAGE OF ALCOHOL IN WINES.

The following are the percentages by weight, and by volume, of absolute Alcohol contained in some of the principal kinds of wine—*Griffin's Tables*:

	—Alcohol in 100 parts.—	
	By weight.	By volume.
Old-bottled Port.....	20·29	25·53
Newly-bottled Port.....	17·30	21·88
Public-house Port.....	20·08	25·29
Madeira.....	16·25	20·55
Sherry, Montilla, 1854.....	16·62	20·67
" Newly-bottled	17·56	21·83
" Oloroso, 1843.....	15·09	18·78
" Newly-bottled.....	16·14	20·08
" Oxford	20·39	25·53
Public-house Sherry.....	17·50	21·97
Tarragona.....	15·42	19·35

LONDON GROCERS' WINES—

British Port.....	14·73	19·00
British Sherry.....	13·56	17·16

GREEK WINES—

Lachryma Christi.....	9·70	13·20
Cyprus.....	10·09	13·50

FRENCH WINES—

Champagne.....	7·95	10·36
Vin Ordinaire.....	6·99	8·74
Paysan's Bordeaux.....	7·32	9·19
St. Julien, 1858.....	9·84	12·34

RHINE WINES—

Castle I. Hock, 16s. doz.....	6·63	8·31
Rudesheimer, 84s. doz.....	13·32	16·66

PERCENTAGE OF ALCOHOL IN SPIRITS.

	—Alcohol in 100 parts.—	
	By weight.	By volume.
Brandy (good)	46·38	54·60
Brandy (common).....	42·29	50·15
Rum	41·28	48·96
Gin.....	31·73	38·56

[The Teacher can have these facts put up as a table, or can write them out on the blackboard.]

PART III.

THE ALCOHOL FAMILY.

All the facts named up to this time were known in the early part of the present century. The chemical composition of Alcohol was also then discovered, and Alcohol was known to be made up of three elements, namely:—

Carbon.
Hydrogen.
Oxygen.

But it was then unknown that there was any other Alcohol except that which was obtained from corn or fruit, or other of the substances from which the ancients obtained spirit by fermentation.

In time it was found that by distilling other organic substances a spirit was to be got from them, which spirit was made up of the same three elements:—

Carbon.
Hydrogen.
Oxygen.

Next it was learned that these elements were always combined in similar proportions of each on a given rule, so that common Alcohol was seen to be only one of a *family* of Alcohols.

The *first* of these new Alcohols was got by the distillation of wood. It was discovered by Mr. Philip Taylor, in 1812, and was soon applied for spirit lamps and for other purposes, as a spirit. It was probably first made commercially by Messrs. Turnbull & Ramsay, of Glasgow.

This spirit has been much used in the arts for varnishes

in the place of common Alcohol. Having a lower boiling point it is more volatile than common Alcohol. For the sake of economy it is often employed in manufactures and for lamps. The name first given to it was wood or pyroxylic spirit. It is now called *methylated spirit*.

Another of the Alcohol series was obtained by the fermentation of potato-starch, or starch of grain. When pure, this Alcohol is a colorless fluid. Its weight, compared with water as one thousand, is eight hundred and eleven, and it boils at two hundred and seventy degrees Fahrenheit. Its odor is sweet, nauseous, and heavy, and the sensation of its presence remains long. In taste it is burning and acrid. It is practically insoluble in water. In its crude state it is called *fusel oil* or *potato spirit*.

Subsequently it was ascertained that when potato spirit is distilled there come over, at various periods of distillation, several other Alcohols. It has also been found that by distilling other fermentable substances than have been yet named, a greater number of different Alcohols are obtainable. But whatever the number, the construction of each is on the same general plan, so that the Alcohols are said to be a group or family of chemical substances.

CONSTRUCTION AND SCIENTIFIC NAMES OF THE ALCOHOL FAMILY.

Each member of the Alcohol family is composed of three elements, *Carbon*, *Hydrogen*, *Oxygen*. In all the Alcohols, the carbon and hydrogen unite to form what is called *a radical*, that is, a chemical body composed of one or more elements, but possessing many of the fixed qualities of a single element.

The first radical of the Alcohol series is called *Methyl*.

Methyl is composed of

1 part Carbon } Methyl.
 3 parts Hydrogen }

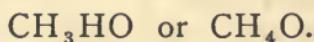
This radical taking the place of one of the hydrogen elements of water, in which fluid there are two hydrogen elements and one of oxygen, namely—

Hydrogen Hydrogen Oxygen } Water,

produces an Alcohol. Thus—

Hydrogen	Methyl	Carbon 1	Methyl
Hydrogen	Hydrogen	Hydrogen 3	Alcohol.
Oxygen	Oxygen		

As the radical is called methyl the Alcohol is called *methyllic*. Its composition written in symbols is



It is the Alcohol we know, commonly, as wood-spirit.

The second radical of the Alcohol series is called *Ethyl*.

Ethyl is composed of

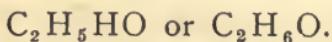
2 parts Carbon } Ethyl.
5 parts Hydrogen

This radical taking the place of one of the hydrogens of water produces another Alcohol. Thus—

Hydrogen Hydrogen Oxygen	}	Water.
Ethyl Hydrogen Oxygen	}	2 Carbon 5 Hydrogen
		}
		Ethylic Alcohol

And as the radical is called ethyl, the Alcohol is called *ethylic*.

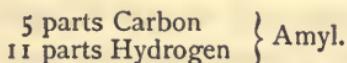
Its composition written in symbols is—



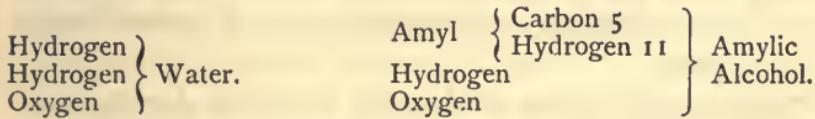
Ethylic Alcohol is Alcohol as it occurs in wine, spirits, beer, and other common drinks. It is Alcohol of grain and fruits.

A fifth radical of the Alcohol series is called *Amyl*.

Amyl is composed of

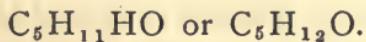


This radical taking the place of one of the hydrogens of water produces also an Alcohol. Thus—



And as the radical is called *amyl*, the Alcohol is called *amylic*.

Its composition written in symbols is—



It is called *amylic* from the Greek word *amulon*, which means starch, of which the potato is largely composed, and from the fermentation of which the Alcohol is obtained.

Between the two Alcohols, ethylic and amylic, there come two other members of the family—*propylic* ($\text{C}_3\text{H}_7\text{HO}$), and *butylic* ($\text{C}_4\text{H}_9\text{HO}$), the carbon and hydrogen increasing, as will be seen, in regular proportion. These Alcohols are obtained during the fractional distillation of crude amylic Alcohol.

[All these forms may be written down on the black-board or exhibited as tables.]

EXPERIMENT.

A very simple experiment suffices to show the increase of carbon in these series. If we take a piece of cotton wick, place it in a cup, pour upon it a little methylic Alcohol (in which Alcohol there is the smallest amount of carbon), set fire to it, and hold a white plate over the flame, the plate remains white, because the air that reaches the flame is sufficient to ensure combustion of all the carbon.

If we do the same with ethylic Alcohol, although the carbon is a little greater, yet the result remains the same.

If we move three steps higher, to amylic Alcohol, in which there are five equivalents of carbon, the combustion is not complete and a dark stain of carbon is left on the plate.

This simple mode of testing common Alcohol will serve, roughly, to detect extreme adulteration of it with the heavier impure Alcohol, fusel oil, which, in alcoholic drinks, is a very dangerous adulterant.

*Next glance at the Alcohols in respect to their
PHYSICAL DISTINCTIONS.*

The physical distinctions between the various Alcohols now before us, are marked by other signs. For example:—

As we move from the methylic Alcohol upwards, we discover that the *vapors of the Alcohols increase in weight*. Thus compared with hydrogen as 1, the vapor density of methylic Alcohol is 16; of ethylic Alcohol, 23; and of amylic, 44.

The *specific gravity* of the Alcohols, that is to say, the weights of these fluids compared with water taken as a standard and estimated at 1,000, differs. Thus the

specific gravity of ethylic Alcohol is 792; of amylic, 811.

The boiling points of the Alcohols differ. The boiling point of methylc Alcohol is 140° Fahr.; of ethylic, 172°; of amylic, 270°.

*Direct attention, finally, to certain
ANALOGIES.*

If, under fitting conditions, we expose diluted common Alcohol to the atmosphere, it becomes acidified, converted into vinegar. This is due to its oxidation, in which process there are two steps: one by which the spirit is converted into a substance called *aldehyde* (dehydrated Alcohol—al-de-hyd); another by which the aldehyde is converted into *acetic acid*, or *vinegar*.

Acted on by acids the Alcohols yield ethers; and common Alcohol acted on by chlorine yields chloroform.

SUMMARY.

All the Alcohols have these common properties:

They are composed of the same elements.

They change in character by regular process of increase of carbon and hydrogen.

They all yield an aldehyde.

They all yield an acid by oxidation.

They have many general uses.

They burn, and the lighter of them are used for the spirit lamp.

They are antiseptic, and can be employed for the preservation of dead animal and vegetable substances.

They dissolve many gums, resins, and other organic substances, which are insoluble in water.

They are all, like chloroform and other similar compounds, chemical, as distinct from natural food products.

SUBJECT II.

ON DRINK IN REGARD TO THE NATURAL WANTS OF MAN.

INTRODUCTION.

The object of the present study will be to show the meaning and value of fluids or drinks for the sustenance of animal life.

Explain that the Subject will be divided into three parts.

I. In the first part it will be shown that water is the one natural drink.

II. In the second part it will be shown that alcoholic drinks can not be included amongst natural drinks.

III. In the third part the reasonable deductions from the facts stated will be drawn.

PART I.

WATER AS THE ONE NATURAL DRINK.

Nothing is more clearly set forth than the fact that water alone is the one drink intended by nature for the uses of man and all animals. This opinion is held even

by those who have not forsaken the use of wine and other strong drinks.

OPINION OF DR. CHEYNE.

Dr. George Cheyne, who in 1725 published his famous book on health and long life, is very explicit on this point. (*Fourth edition*, pp. 42-48.) He says:—

“The common drink here,—in England,—is either water, malt liquor, or wine, or mixtures of these; for cider and perry are drank but in few places, and rather for pleasure and variety than use.

“Without any dispute water was the primitive, original beverage, as it is the only simple fluid fitted for diluting, moistening, and cooling,—the ends of drink appointed by nature. Happy had it been for the race of mankind if other mixed and artificial liquors had never been invented.

“It has been an agreeable appearance to me,” continues this author, “to observe with what freshness and vigor those who, though eating freely of flesh meat, yet drank nothing but this element, have lived in health and cheerfulness to a great age.

“Water alone is sufficient and effectual for all purposes of human wants in drink. Strong liquors were never designed for common use. They were formerly kept (here in England) as the other medicines are in apothecaries’ shops.

“Nothing is more ridiculous than for persons to continue drinking large quantities of spirituous liquors on the plea that they have been accustomed so to do, and they think it dangerous to leave off all of a sudden. It were as reasonable for him that has fallen into the fire or water to lie there because of the danger of removing him suddenly.

“ Those whose appetite and digestion are good and entire, never want strong liquors to supply spirits; such spirits are too volatile and fugitive for any solid or useful purposes in life. Two ounces of flesh meat, well digested, beget a greater stock of more durable and useful spirits than ten times as much strong liquors.

“ Happy those whom their parents, their natural aversion to strong liquors, or whom kind Providence among the better sort, has brought to the Age of Maturity and Discretion without dealing in, or desiring any great quantity of, strong liquors. Their passions have been calmer, their sensations more exquisite, their appetites less unruly, and their Health more uninterrupted, than any other natural cause could have produced. And thrice happy they who continue this course to their last minutes.

“ A great mistake committed in this affair is, that most people think the only remedy for gluttony is drunkenness, or that the cure of a surfeit of meat is a surfeit of wine. Than which nothing can be more false or contrary to nature, for 'tis lighting, as the saying is, the candle at both ends. For, first of all, wine and all other strong liquors are as hard to digest, and require as much labor of the digestive powers, as strong food itself. This is not only evident with respect to people of weak stomachs, but also from hence that healthy people who drink only water, or weak small beer, shall be able to eat and digest almost double of what they could did they drink strong liquors at their meals, as every one that pleases may experience.

“ Water is the only universal dissolvent or menstruum, and the most certain diluter of all bodies proper for food, though there are a great many that spirituous liquors not only will not dissolve, but will harden and make more indigestible.

"I have known men," adds Dr. Cheyne, "of weak and tender constitutions who could neither eat nor digest upon drinking of wine, who, by drinking at meals common water heated, have recovered their appetites and digestion, have thriven and grown plump."

This experience of Dr. Cheyne is backed up by many other considerations which are of equal force.

WATER AND LIVING THINGS.

In the universe of life man forms but a fractional part. All the sea is full of life; all the woods are full of life; all the air is full of life; on the surface of the earth man possesses, as companions or as enemies, herds and herds of living forms.

Of that visible life man is but a minute speck.

Beyond the visible life on the earth and in the sea are those minute worlds of animal life which are invisible to common view, with their myriads of forms unseen, and requiring the most penetrating microscope to reach.

Again, there are forms of vegetable life; plants innumerable, from gigantic Wellingtonias to lichens and mosses, and beneath these myriads more so infinitely minute that the best microscope almost fails to reach them.

This is all life, life which goes through its set phases in due form; grows in health, and strength, and beauty, every part of it, from highest to lowest living grade, without a shade of the use of the strong spirit—the spirit of wine, beer, and other intoxicating drink.

What evidence can be more conclusive that Alcohol is not included in the general scheme of life as a drink?

FIRST DRINK FOR MAN.

Another piece of evidence in the same direction relates to the drink first provided for man himself; for

him during the time when he is entirely helpless. This drink, which we call milk, is both food and drink.

COMPOSITION OF HUMAN MILK.

This drink, *milk*, as intended for man in his earliest days, contains, according to the latest analysis, by Mr. Wynter Blyth:—

	Per cent.
Milk fat (butter).....	2.90
Caseine (cheese).....	2.40
Albumen.....	.57
Galactine.....	.10
Sugar (sugar of milk).....	5.87
Ash.....	.16
Water.....	88.00
	<hr/>
	100.00

[These details can either be illustrated by a table or written down on the blackboard.]

There is given to us, therefore, by nature, as seen in the analysis of milk, all that is necessary for infant life, that is to say, for life during its most helpless condition.

In milk the butter and the sugar are foods supplied for the sustainment of the warmth of the body and for vital motion.

In milk the caseine and the albumen are supplied to sustain the parts of the body that make up its organic structures, such as the muscles and tendons, the membranes, the animal part of the bones, parts of the nervous organs, and parts of the blood.

In milk the ash supplies the earthy substance or mineral food for building the solid parts of the bones,—the skeleton.

In milk the water supplies all the drink that is necessary for the life of the infant.

Comment on the importance of this lesson from natural history, and illustrate further from the following deductions.

In milk there is a standard food.

That food is a food and a drink.

It is made for man and for immense numbers of other animals.

It is meant for them when they can not get any food for themselves.

It supplies every want that food and drink can supply.

It supplies these wants at a time when the wants are most urgent.

It is constructed on an entirely natural design without any reference to human wishes or inventions, and, indeed, before there were any such desires or inventions.

We have next to consider what is a natural drink.

A natural drink is one which neither offends nor gratifies the senses of taste or smell, but which is neutral to both these senses.

A natural drink, when taken into the mouth and swallowed, causes no irritation, no pain, no sense of burning, no constriction of the throat, no difficulty in the process of being swallowed.

A natural drink, on being received into the stomach, causes no heat there, no sensation of uneasiness, no sensation of nausea or sickness, no distention, and no eructation.

A natural drink has the property of dissolving all saline and saccharine substances such as common salt and sugar.

A natural drink has the property of uniting with fleshy and albuminous substances, such as flesh of meat,

albumen of egg, casein of cheese, and of hydrating or entering into solution with these substances.

A natural drink has the property of carrying all solid foods in partial or complete solution into the stomach, ready to undergo digestion there.

A natural drink in combination with foods in the stomach can mingle with the digestive juices and take part in the solution and digestion of the foods.

A natural drink can carry the foods, after they are digested, through the various transmitting channels into the blood to mix with the blood.

A natural drink can form a large portion of the blood (75 per cent.), without producing in the blood-vessels any irritation or disturbance.

A natural drink can hold the other parts of the blood, the albumen, the fibrine, the salts, and the little round bodies called the blood corpuscles, red and white, in suspension through the blood.

A natural drink will not act injuriously upon the blood corpuscles so as to change them in shape, increase or lessen their volume, or in any way injure them for their duties.

A natural drink will carry all the nutrient parts of the blood to their respective destinations, will pass through the membranes of the body with the soluble saline substances or salts, and will leave the substances out of which the solid parts of the body are built in their proper places as required for purposes of nutrition.

A natural drink will absorb the heat of the body as it is generated in the animal combustion, and will cause equal diffusion of the heat throughout all parts.

A natural drink will fill up all the soft structures of the body, so as to give to them form, volume, and flexibility.

A natural drink will flow or escape from the *se-cret-ing* organs of the body, as the fluid part of secretions, and will become, in this way, the chief volume of all secretions, of the bile, of the saliva, and of other similar secreted fluids.

A natural drink will flow or escape from the *ex-cret-ing* organs of the body, with the fluid excretions, such as the perspiration.

A natural drink will evaporate from the external surface of the body or skin in the form of vapor, and so equalize the temperature of the body, keeping it cool by evaporation, even in the hottest regions of the habitable earth.

A natural drink will assuage thirst, without creating a special desire or craving for itself, and without inducing more thirst.

These are the natural requirements of a drink duly fitted for men and animals, and for all the purposes of their lives in the way of drink, in all periods of life, in all climates, and under all natural conditions.

A natural drink exists for these purposes.

And, such a drink is formed on the most abundant scale by nature. It falls in rain, it runs in mountain rills, it runs in streams and rivers. It is constantly being drawn up or distilled from the earth by the heat of the sun into clouds. It is condensed by the mountain tops into snow, it returns to the earth a fluid in drops or torrents; it is stored in lakes and pools on the surface of the earth and in watersheds under the surface of the earth.

This fluid, all-sufficient in quality and in quantity, is called WATER.

No other fluid is required as drink for living things.

No other fluid can possibly take its place as a food and a drink.

State why water fulfils all purposes.

Because there is no other fluid whatever known, that possesses its properties as stated above.

And, because there is no other fluid supplied to man and the living creation in sufficient quantity, for his or their wants.

PART II.

ALCOHOLIC DRINKS UNNATURAL DRINKS.

If Alcohol were wanted to keep the body warm, it would, naturally, be present in the first natural food.

If Alcohol were necessary for the building up and growth of the fleshy parts of the body, it would, naturally, be present in the first natural food.

If Alcohol were necessary for the building up of the bones or skeleton, it would, naturally, be present in the first natural food.

If Alcohol were necessary as a drink, it would, naturally, be present in the first natural food.

But it is not present, and the inference therefore must be, that if the nature from which we are all derived, and which preceded us, be right, Alcohol is not included in her design as a feeding mother, and is not therefore necessary during the first stages of life.

DRINK FOR LATER LIFE.

The argument that there is no natural necessity for Alcohol extends further than to the days included merely in infancy.

The child grows up without having to resort to Alcohol.

The child develops in body and mind rapidly, more rapidly in the child-period of life than in any other, without having to resort to Alcohol.

The child spends the happiest part of life, if it be favorably circumstanced, without having to resort to Alcohol.

The child feels, if he be born healthy, no desire or craving for Alcoholic drink, and when induced to taste or swallow it, rejects it as something that is disagreeable, and injurious or even painful.

Illustrate further from periods of life.

Suppose, then, we take the natural course of life in man, and put it at its almost best, say ninety years.

Suppose we give to childhood and first *youth fifteen years*, during which, in healthy, properly bred children no strong drink is taken at any time either for food or drink.

Then it is clear that a sixth part of that long life is capable of going on in the full swing of activity at a time when growth is most rapid.

But if life can go on so well for one-sixth of its course, why not for the remaining five-sixths?

Introduce another argument relating to practice of commencing the use of Alcoholic drinks.

We know, as an ordinary matter of fact observed in every-day life, that when persons who are young begin to take strong drink, they are led to it, not from any sense of necessity, but from imitation of others who take it instead of water without assigning any reason, who have become fond of it from mere habit and nothing else, and who press it upon others because they are

fond of it themselves or have some loose notion that it does them good, often when it is really doing them very considerable harm.

[Illustrate this point still further from any independent facts of detail or observation.]

Support argument by reference to nations.

In addition to these facts we know that there have been many men and women, millions and millions of them, who have gone on through the four stages of life, from the first to the last, without resort to this agent, Alcohol, for the support of life. Some peoples forming whole nations have never heard of strong drinks. Some have heard of them, and have abjured their use. In England and America at this time there are probably five to six millions of persons who have abjured these agents. Do these persons fall or fail in value of life from the abjuration? The evidence is all the other way.

[Introduce here any other points in the way of illustration, and introduce facts related in Subject VI. of this series, entitled "Temperance and Health," if required.]

If every man, woman, and child living made wine or other similar drink their usual drink, if they could not live without it, and if all other animals were under the same requirement, then there simply could not be life, because there is no provision for life on such form of maintenance.

Everything that every living being requires, is made for it.

The table of nature is spread, bountifully spread, for all its millions upon millions of guests; but wine and strong drink are not on that table. A clever man may make strong drink, and put it on a side table for him

self and a few of his friends, but he can not make it for universal needs, and if he could he would destroy life itself in the cleverness of his attempt to compete with natural law.

If skilled men examine the bodies of animals that are dead, they can, by chemical research, discover of what structures the bodies of animals are formed.

They can discover that some animals of the lowest forms are made up almost altogether of water, with a minute trace of solid organic and inorganic matter.

They can find in the higher animals bones, muscles, tendons, nerves, organs of sense, fat, membranes, blood, secretions and other fluids.

If they take to pieces, if we may so express it, these different organs or parts, they can see in them minute bodies called *cells*, and *tissues* holding the cells together, and fluids in the cells and tissues.

They can examine these minute portions and find out, to a considerable extent, of what they are made, and how they are put together.

They can compare these parts of the animals with the food upon which the animals had been fed, and can trace out from what they find the food which has been the source of each structure.

They can get out of the parts, water, fibrine, albumen, caseine, fat, iron, all else that belongs to the body and has been derived from food.

But in the natural state they can trace out no such thing as wine, or that spirit of wine which distinguishes wine from water, in the structures or textures or fluids of the body in any part of it.

If in any animal they were to find the spirit of wine present, they would know that it had no natural place there, and they would, as a rule, discover in the body that contained it some signs of diseases which had been

produced by it, and which are well known as being often produced by it.

[*This last point can, at the pleasure of the teacher, be illustrated at greater length by inserting notes from Subject VIII. of this series, entitled "Intemperance and Disease."*]

State why Alcohol fails to be a natural drink.

Alcohol can not possibly represent water as a drink, for the following reasons :—

Alcohol first offends and then depraves the senses of taste and of smell.

Alcohol, unless very largely diluted with water, produces, when taken, irritation or pain, a sense of burning in the mouth, and a feeling of constriction in the throat.

Alcohol produces a sensation of burning in the stomach, even when considerably diluted with water, and until the stomach gets habituated to it, it causes nausea or sickness, with distention and eructation.

Alcohol creates a sensation of sinking in the stomach, attended with an unnatural craving for itself when neither natural food nor drink are demanded.

Alcohol does not dissolve saline and saccharine foods as water does, but interferes with such solution in proportion to the amount of it that is present.

Alcohol, instead of rendering fleshy foods soluble, has the tendency to coagulate or solidify fleshy and albuminous foods, and to render them, thereby, more difficult of digestion.

Alcohol has no property of carrying solid foods in partial or complete solution into the stomach for digestion.

Alcohol mixed with water, with food, and the digestive juices in the stomach, easily causes precipitation of

the active principle of the digestive juices, pepsine coagulates albuminous substances; suspends, and, if it be present in large quantities, entirely stops the digestion of food until it is removed by absorption or acetification.

Alcohol in no way assists the conveyance of digested fluid food from the digestive system to the blood, but is often a source of irritation to the lining membranes of the blood-vessels when it is received into the blood.

Alcohol in the blood does not help to hold the different parts of that fluid in natural solution or suspension; on the contrary, when in extreme solution, it tends to make the blood too liquid or thin, while in concentration it coagulates or thickens the blood.

Alcohol acts injuriously on the blood corpuscles, altering the shape of the red corpuscles and interfering very much with their power of absorbing and condensing oxygen, which is the important function belonging to them.

Alcohol does not assist in distributing to their natural destinations, the parts of the food which are required for building up the different structures of the body, in natural order and position.

Alcohol does not save or conserve the heat of the body as that is generated, but by reducing the function of the blood corpuscles, reduces the generation of heat.

Alcohol does not fill up the soft structures of the body, nor give form, volume, or flexibility.

Alcohol, escaping with the secretions, interferes with them in their function, and often interferes with the process of production of secretions, making them either scanty or too profuse.

Alcohol interferes, in like manner, with the process of excretion, often rendering the excretions acid and irritating, too scanty, or too profuse. Taken in any

excess it interferes, mischievously, with the functions of the skin and other excreting organs.

Alcohol does not equalize animal temperature, but creates first a temporary fever or heat, then a chilliness and coldness of the body. It is thus bad both in hot and in cold weather.

Alcohol does not assuage thirst. On the contrary, it causes frequently a sensation of thirst and a desire for more fluid than is good for health. It also creates a special desire or craving for itself.

Alcohol, for common use, has to be artificially manufactured, and could not be manufactured on a sufficiently large scale to meet the requirements of all living beings if all found it necessary as drink in the same way that water is necessary.

Alcohol can not, therefore, in any sense whatever, be accepted as a drink fitted for the sustainment of life and health.

PART III.

REASONABLE DEDUCTIONS.

The reasonable deductions to be drawn from what has preceded are :—

1. That water is the all-sufficient drink or natural fluid food for man and beast.
2. That Alcohol has no property whatever suggesting its use as a drink.
3. That all wise people will let the natural gift distilled for them from the earth and coming to them as water, play its natural part for their services and necessities.

SUBJECT III.

FOOD IN RELATION TO NATURAL NECESSITY.

INTRODUCTION.

In this Subject it is proposed to consider food as a natural necessity for man, including the nature of foods in relation to the body.

If we can understand clearly the nature of the various foods which are absolutely necessary for the maintenance of the body, for its construction, and for its healthy and active life, we shall see if Alcohol is a food.

Under the head of foods must be included fluid foods, like milk, as well as solid, like bread.

Explain that the Subject will be divided into three parts.

- I. The nature and qualities of foods.
- II. The question whether Alcohol admits of being introduced, under any head, as a food.
- III. The deductions which may be drawn from the facts supplied.

PART I.

THE NATURE AND QUALITIES OF FOODS.

The term food or foods means anything that will perform the following services to the body:—

Build up or repair the bodily waste, healthily.

Sustain the animal warmth.

Sustain the animal motion, the muscular power.

Sustain the brain and nervous system, the nervous power, and the mental activity.

Hence foods are sometimes divided into two broad classes :

(a.) Nutrient or building foods.

(b.) Force-giving foods.

Foods, again, are sometimes classified according to their construction, when they are divided into the following classes :—

(a.) Foods containing the element nitrogen ; the leading representative of these foods is albumen, but they include also fibrine or flesh, caseine or cheese, gelatine or jelly.

These foods are called *nitrogenous, albuminous, or colloidal-jelly-like-foods* ; or, as they make up the greater part of the structures of the body,—*structural foods*.

(b.) Foods containing the elements hydrogen and carbon ; the leading representative of these foods is starch, but they include also sugars, oils, and fats.

These foods are called *hydro-carbons* or *hydro-carbonaceous foods* ; and, as they are burned in the body by a process of slow burning,—*eremacausis*,—when they come in contact with the oxygen derived through the breathing, they are also said to be *respiratory foods* or *combustible foods*.

(c.) Foods containing mineral or earthy material, the leading representative of which is calcium phosphate,—phosphate of lime,—but including also sodium chloride,—common salt,—lime carbonate, and some other salts in small quantities. These foods are called mineral or saline foods, and one of them, the phosphate of lime,

which forms a large proportion of the skeleton,—over fifty-seven per cent.—and which gives the solidity to the skeleton, is often called *mineral bone* food. Sodium chloride, which is found in the blood, and which gives a saline taste to the blood, is sometimes called the salt of that fluid.

(d.) Water food, that is to say, the water which is taken into the body as drink, which makes up sixty-five per cent. of the weight of the body, which gives bulk and form to all the soft structures, which carries all the other foods over the body, and which carries all the resolved or used-up foods out of the body.

ILLUSTRATIONS OF TYPICAL FOODS.

Milk and eggs may be taken as good illustrations of typical foods.

EGGS.

	PER CENT. WHITE.	PER CENT. YOLK.	PER CENT. COMBINED.
Constructive Foods—			
Albumen.....	20·40	16·00	18·20
Respiratory Foods—			
Fat.....	00·00	30·80	15·40
Saline Foods.....	1·50	1·30	1·40
Water	78·00	52·00	65·00
			100·00

MILK OF THE COW.

Constructive Foods—

	PER CENT.	PER CENT.
Caseine.....	3·98	
Albumen	·77	
Galactine.....	·17	
		4·92

Respiratory Foods—

Butter	3·50
Sugar.....	4·00
	7·50

Saline Foods—

Calcium Phosphate, Sodium Phosphate, and other Salts.....	0.70	
	—	0.70
Water	86.88	—
	—	86.88
		—
		100.00

A TYPICAL MIXED FOOD, 100 OUNCES.

	DRY.	MOIST
Constructive Foods.....	3.75	16.00
Respiratory Foods.....	20.50	24.00
Saline Food.....	0.75	0.75
Water	75.00	59.25
	—	—
	100.00	100.00

QUANTITY OF FOODS REQUIRED PER DAY FOR AN ADULT.

Estimated on Milk as the Type.

	OUNCES.
Constructive Foods (moist).....	16
Respiratory Foods—	
Sugar	1 }
Fat	3 }
Bread or Potato.....	20
Saline Food	½
Water.....	50
	—
	90½

Dr. Dalton calculates for per day:—

Constructive Foods (moist).....	16
Respiratory Foods—	
Bread	19
Fat.....	3½ }
Water.....	52
	—
	90½

SOURCES OF FOOD SUPPLIES.

All foods are derived originally from the vegetable world, and however nicely they are proportioned so as to meet absolute wants, they are never healthy foods unless some fresh vegetable or fruit forms, each day, a part.

Some vegetables contain in themselves all the parts of food in good proportions as standards.

The following are types of this kind:—

FRESH MUSHROOMS.

Fresh Mushrooms contain

	PER CENT.
Constructive Foods (albuminous).....	5·00
Respiratory Foods.....	4·50
Saline Foods.....	0·50
Water	90·00
	<hr/>
	100·00

Some fruits approach the natural standard.

BANANAS.

	PER CENT.
Constructive Foods (albuminous).....	5·00
Respiratory Foods—	
Sugar.....	19·70 {
Fat.....	60 }
	20·30
Saline Food.....	·80
Water.....	73·90
	<hr/>
	100·00

In Bananas it will be seen the Respiratory Food is over, the water under, the standard.

Wheat corn, from which we gain the staff of life, bread, contains all the elements of food in a condensed form, *i. e.*, with little water. It is preserved food in the most perfect state of concentration.

WHEAT.

Wheat contains

	PER CENT.
Constructive Foods (albuminous).....	13.60
Respiratory Foods—	
Starch	69.00 }
Fat.....	1.20 }
Saline Foods.....	1.70
Water.....	14.50
	<hr/>
	100.00

[*The Teacher can select from the above data tables for illustration or exercises for the blackboard.*]

SUMMARY OF FACTS.

The varieties of foods named above are such as are necessary for the healthy construction of the body, and, when they are combined with the vegetable acids contained naturally in fresh vegetables and fruits, they are all sufficient for the purposes of life.

The constructive foods supply what is wanted for building up the muscles with the sinews or tendons; the albuminous part of the brain and nervous systems; the glands; the membranes, including the skin; and the gelatinous part of the skeleton; in fact, soft structures generally.

The respiratory foods yield all that is sufficient for the fatty parts of the body, for the fatty material present in the brain and nervous system, and for the fatty matter which lies beneath the skin and in other parts. The respiratory food also supplies the material for combustion and production of animal warmth.

The saline food supplies the mineral matter for the solidification of the skeleton and the salt required for the blood.

USES OF WATER AS FLUID FOOD.

The water supplies every necessity as a fluid for the body.

Water renders soluble, or, as it is technically said, hydrates, the constructive or colloidal foods.

Water makes soluble the saline and saccharine foods.

Water carries all these foods from the mouth into the stomach and digestive organs.

Water is the diluent of the digestive juices.

Water carries the digested foods through the natural channels into the blood.

Water makes up the great volume (75 per cent.) of the blood.

Water distributes the food to all parts of the body, leaving the albuminous or colloidal in their required places, and carrying the saline foods to their places.

Water equalizes and generally diffuses the heat which is produced in the combustion going on in the body.

Water carries in the secretions, such as the gastric juice, bile, saliva, particularly substances secreted or selected out by the different glands.

Water is the bearer of all excreted fluids, such as those contained in the tears and perspiration, and makes up the volume of those excretions.

Water, by its evaporation from the body, mainly by the skin, prevents accumulation of heat.

Water assuages thirst without creating any craving or desire for itself.

Water performs all these functions without creating any irritation or fever, or pain, or coldness, or heat.

In a word, water, as the fluid food, fulfils all purposes which are demanded for the maintenance and functions of healthy life.

PART II.

IS ALCOHOL A FOOD?

We come now to the study of the important question whether Alcohol admits of being introduced under any of the above-named heads as a food.

IS ALCOHOL A CONSTRUCTIVE FOOD?

The answer to this question is exceedingly simple and plain.

Alcohol contains three elements: carbon, hydrogen, and oxygen. The Alcohol in the ordinary alcoholic beverages consists of carbon two parts, hydrogen six parts, oxygen one part.

Alcohol, therefore, does not contain nitrogen, and can not be a nitrogenous food; it can not build up fleshy structures, which are nitrogenous, as fleshy and albuminous foods can.

In this sense, therefore, Alcohol is not a food, and when it is talked of as useful for building up the body, as we often hear, the talk is erroneous altogether.

IS ALCOHOL A RESPIRATORY FOOD?

There is a substance in the body which is commonly called fat, and this substance, like Alcohol, is a hydro-carbon. Alcohol might, therefore, form fat, but the evidence is not in favor of this view. The alcoholic drinks which fatten are those like beer, and rum, and sweet wines, which contain sugar in addition to Alcohol, and it is the sugar, not the Alcohol, which produces the fatness. Alcoholic drinks which contain no sweet substance fail to fatten.

If it were proved that Alcohol did produce fat, the

proof would be no argument in its favor, because the production of fat, except in a very limited degree, is a disadvantage. Fat is practically an excretion from the blood. It is a substance thrown out into the loose tissues of the body as something over and above what the body requires; and although in a limited degree it is a reserve food, and in that sense is useful to some animals, those, for instance, which hibernate or sleep in cold seasons, it is dangerous, ordinarily, if it be laid by in the tissues in any excess.

It has been observed, however, that those who indulge in alcoholic drinks are apt to suffer from fatty disease of the heart, in which disease the muscular structure of the heart and of other muscular organs is replaced by fatty structure. The structure of the brain, also, in those who indulge in Alcohol is prone to undergo fatty change. Further, the same change may extend to the arterial vessels of the body. This change is not natural. It is not induced by Alcohol itself being turned into fat, but by the impaired or deranged nutrition which Alcohol, by its presence, produces.

In this sense, consequently, Alcohol is the very opposite of a sustaining food. It is a destroyer.

The question now under consideration is, then, by process of exclusion brought down to the following:

Alcohol is a hydro-carbon like fat and oil. Out of the body it burns as fats and oils do. We see it burn in the spirit lamp.

Does Alcohol burn by slow combustion within the body as if it were a respiratory food?

Until these late years the general opinion has been in favor of the view that it does burn.

This opinion was not, however, accepted absolutely. Some practical men, who had worked in the coldest regions, disputed it.

Sir John Ross, describing his voyage to the Arctic regions from 1829 to 1833, said :—

“ I was twenty years older than any of the officers or crew, and thirty years older than all excepting three; yet I could stand the cold better than any of them, who all made use of tobacco and spirits. I entirely abstained from them. The most irresistible proof of the value of abstinence from spirituous liquors was when we abandoned our ship and were obliged to leave behind us *all* our wine and spirits, because we could not carry any in our heavy-loaded sledges, which we had to drag nine hundred miles before we got to Fury Beach. There, indeed, we found provisions, but, thank God ! *no spirits.* And it was remarkable to observe how much stronger and more able the men were to do their work when they had nothing but water to drink ! ”

The same experience has now been confirmed by many other observers under similar circumstances.

The same general experience has been fully confirmed by experimental proving.

It is now shown by observations made upon men and animals that after a slight flush and rise of temperature during a first short stage of excitement under the influence of Alcohol, there is decided decrease of temperature, which, in deep intoxication, may extend to a fall of 7 deg. Fahr., and may, in fact, be a cause of death by cold.

It has been further shown that cold and Alcohol go together, the one intensifying the effects of the other.

Again, it has been shown definitely, that the great product of the animal combustion, carbonic acid gas, which is thrown off in the expired breath in proportion to the degree of combustion that is going on in the body, is diminished in quantity,—just as it is in a wan-

ing lamp or a failing fire,—when the body is under the influence of Alcohol.

Alcohol can not therefore rank as a respiratory food.

IS ALCOHOL A MINERAL FOOD?

Alcohol contains none of the basic elements present in the saline or mineral foods.

It may, therefore, be at once dismissed as a mineral food.

CAN ALCOHOL TAKE THE PLACE OF WATER AS FOOD?

Alcohol does not respond to any of the requirements which water fulfils and which have been stated already, but interferes with every one of these requirements.

Alcohol does not slake thirst, but encourages it.

Alcohol does not give a healthy appetite for food, but begets an appetite for itself which destroys natural appetite.

As a representative of water Alcohol is worse than worthless. It is injurious taken in small quantities. It easily becomes fatally injurious when the quantities are at all large.

[On the relationships of water and Alcohol as foods, the Teacher may, if he wishes, refer here to the contrasts which were given in Subject II.]

PART III.

PRACTICAL DEDUCTIONS.

The practical deductions from all the facts related are:—

1. That alcoholic fluids need never be taken under the belief that they represent either food or drink.

2. That taken in moderate proportions they are at best useless, and that taken in excess they interfere with the action of natural food and drink, and are in every sense injurious.
3. That the seeming warmth and energy which they impart are due simply to stimulation, which is neither warmth nor energy, but the reducer of both.

SUBJECT IV.

THE ACTION OF ALCOHOL ON THE LIVING BODY.

INTRODUCTION.

It is proposed in this Subject to study the part which Alcohol plays when it is introduced into the living body.

That Alcohol, when it has been introduced into the body, plays an important part there, every one knows, because the effects produced by it and manifested through its action are exceedingly distinctive.

Explain that the subject for study will be divided into three parts, based on three different questions.

- I. What are the effects produced by Alcohol on the living body ?
- II. How are the effects produced ?
- III. Are the effects for good or for evil ?

PART I.

WHAT EFFECTS ARE PRODUCED ON THE LIVING BODY BY ALCOHOL?

In answering this first question we must take a preliminary view of the manner in which Alcohol may be introduced into the body.

MODE OF INTRODUCTION.

Alcohol will enter the body by many channels.

Alcohol, after proper dilution with water, can be introduced by injecting it under the skin or into a vein, and will act very rapidly after such mode of introduction.

Expanded by heat into the form of vapor, Alcohol may be inhaled by man or animal, when it will penetrate into the lungs, will diffuse through the bronchial tubes, will pass into the minute air-vesicles of the lungs, will travel through the minute circulation, with the blood that is going over the air-vesicles, to the heart, will condense in that blood, will go direct to the left side of the heart, thence into the arterial canals, and so throughout the body. The action of Alcohol is very slowly induced by this mode of introduction.

Again, Alcohol can be taken in by the more ordinary channel, the stomach. Through this channel it finds its way, readily, into the circulation. A certain portion of it,—the greater portion of it,—is absorbed direct by the veins of the alimentary surface, and finds its way straight into the larger veins which lead up to the heart and onward with the course of the blood.

Some are of opinion that Alcohol is entirely absorbed, in this way, from the stomach ; but it is possible that some little portion may pass through the stomach and be absorbed from the alimentary canal below.

But in whatever way the Alcohol is introduced, it enters the blood.

Except for experimental inquiries the introduction is always by the alimentary system, and we may, for all practical purposes, only think of Alcohol as a fluid taken by the mouth into the stomach, to be absorbed

like a food or drink from the surface of the alimentary canal.

Suppose, then, a certain measure of Alcohol be taken into the stomach it will be absorbed from the stomach and digestive system into the body.

But, previous to absorption, it will have to be subjected to dilution with water, for there is this peculiarity respecting Alcohol: that when it is separated by an animal membrane from a fluid like the blood, it will not pass through the membrane until it has become charged, to a given point of dilution, with water.

Alcohol is itself, in fact, so greedy for water it will pick up from watery textures and deprive them of water until it is sufficiently diluted, after which it will diffuse into the current of circulating fluid.

When we know the course which the Alcohol takes in its passage through the body, from the period of its absorption to that of its elimination or removal, we are the better able to judge what physical changes it induces in the different organs and structures with which it comes into contact.

After absorption, Alcohol reaches the blood, but, as a rule, the quantity of it that enters the circulation is insufficient, under ordinary circumstances, to produce any serious effect on the blood. If, however, the dose taken be excessively large, then, even the blood, rich as it is in water—and it contains seven hundred and ninety parts in a thousand—is dangerously affected.

ACTION OF ALCOHOL ON BLOOD.

The Alcohol is diffused through the water of the blood, and so diffused, comes in contact with the other constituent parts of the blood.

(a.) With the fibrine or plastic substance, which, when blood is drawn, clots or coagulates, and which is present

in the proportion of from two to three parts in a thousand.

(b.) With the albumen, which exists in the proportion of seventy parts in a thousand.

(c.) With the salts, which form about ten parts.

(d.) With the fatty matters.

(e.) With those minute, round bodies which float in myriads in the blood,—which were originally demonstrated by the Dutch philosopher, Leuwenhoeck, as one of the first results of microscopical observation, about the middle of the seventeenth century,—and which are called the blood globules or corpuscles.

With these parts of the blood, with the water, fibrine, albumen, salts, fatty matter, and corpuscles, the Alcohol comes in contact after it enters the blood, and if it be in sufficient quantity it produces disturbing action, especially on the blood cells.

These last-named bodies, or blood cells, are of two kinds. The greater number have, when natural, a smooth outline, are depressed in the centre, and are red in color, the color of the blood being derived from them. They are called, therefore, the red cells, or corpuscles.

The other corpuscles or cells in the blood are in much smaller quantity, and are called the white cells.

The red corpuscles perform most important functions in the economy. They absorb, in great part, the oxygen, which we inhale in breathing, and carry it to the extreme tissues of the body. They absorb, in great part, the carbonic acid gas which is produced in the combustion of the body in the extreme parts, and bring that gas back to the lungs to be exchanged for oxygen there. In short, they are the vital instruments of the circulation.

The action of Alcohol on the red corpuscles is varied.

It may cause the corpuscles to run too closely together and to adhere together in rolls. It may modify their outline, making the clear, defined, smooth outer edge irregular or stellate, starlike. It may change the round shape of the corpuscle into an oval.

These changes are due to the action of the spirit upon the water contained in the corpuscles, upon the capacity of the spirit to extract water from them. During every stage of modification thus described, the function of the corpuscle to absorb and fix gases is impaired, and if aggregation of cells into masses is caused, other difficulties arise, for the cells uniting together, and passing less easily than they should through the minute vessels of the lungs and of the general circulation, impede the blood current, by which local injuries are produced.

The effect of Alcohol upon the blood is, therefore, critical and often dangerous; for whenever the red blood cells are at all injured or changed, the active natural function of the blood is necessarily deranged. Dr. Lees has suggested that the coldness of the body which occurs when large quantities of Alcohol have been taken, is due to interference with the function of the red corpuscles for absorbing oxygen.

Alcohol is essentially what may be called a blood poison.

ACTION ON THE MINUTE BLOOD-VESSELS.

A further effect of Alcohol is on the minute blood-vessels of the body.

The arteries which carry the rich oxidized blood from the heart all over the body, terminate in very minute web-like branches which become continuous with the veins.

These exceedingly small arteries, called arterioles,

which are only large enough to allow a blood corpuscle, one three-thousandth of an inch in diameter, to pass through them, possess, nevertheless, the power of contraction, and by such contraction regulate with the greatest nicety the quantity of blood which traverses them in response to the stroke of the heart.

Under the influence of some agents taken into the blood, this contractile power of the small arteries is increased.

Under the influence of other agents it is weakened.

Alcohol is an agent which, being taken into the blood, reduces or weakens the contractile power of the minute blood-vessels.

For this reason, after Alcohol has been taken freely, the surfaces of the body seem flushed and full of blood.

So a man is often said to be flushed with wine. This effect of Alcohol requires to be carefully remembered, as it affords explanation of other phenomena.

GENERAL EFFECTS OF ALCOHOL ON THE BODY.

We may now consider some of the more general, or, as they may be called, external effects produced by Alcohol in its action on the living body.

DEGREES OR STAGES OF ACTION.

Alcohol taken into the body in sufficient quantity to produce its fullest effects, short of actual death, causes four distinct degrees or stages of action.

1.—The first stage or degree is one in which the person affected is a little excited in mind. The face and the surface of the body generally is red and flushed. The surface is also from half a degree to a degree and a half Fahr. raised in temperature. The skin is rather dry. The mind of the person is brisk and often irri-

table. The tongue is loosened, and the thoughts are said to flow.

This is the stage of *excitement or hilarity*.

2.—The second stage or degree is one in which there is still some excitement of mind and body, and sometimes a flush on the face and skin generally, but not so bright as before, with continued rapidity of thought and utterance.

Changes, however, have occurred. The temperature of the body is not so high. The memory is not quite so clear. The person affected is conscious of possible failure in what he says or does. He talks more volubly, but with emotion, laughing, crying, or getting easily excited, or becoming easily depressed. In this stage passions and quarrels are of common occurrence.

This is the stage of *emotional intoxication*.

3.—In the third stage the phenomena are changed greatly. The red color or flush has disappeared. The temperature of the body has fallen, perhaps, below what is natural. The mind is irritable and uncertain, passionate or maudlin, sometimes vindictive, usually over-sentimental, over-confiding, and complaining of "wounds without cause." The speech is often babbling, the utterance thick. The muscles of the lips are partly palsied. All the muscles of the body are greatly reduced in steadiness, and, though sometimes much excited, are actually enfeebled. The gait is uncertain, and the body is inclined to reel and even to fall.

This is the stage of *mental and bodily intoxication*.

4.—In the fourth stage or degree the body is completely prostrate. The surface is cold, the temperature being often down three, four, and even five degrees below what is natural. The muscular power is entirely gone. The mental power is entirely gone. The man or woman lies like a log, unconscious of pain, and of

everything that is going on around. The breathing is heavy and snoring, or as the doctors say "stertorous," and sometimes there are attempts at vomiting. The action of the heart is slow and feeble. In this state the body remains until it is liberated from some of the Alcohol which has poisoned it; then it begins, gradually, to recover.

This is the stage of *absolute intoxication, dead drunkenness.*

In the worst examples of all, the breathing and the heart cease. There is then actual death from Alcohol.

EFFECTS OF ALCOHOL ON THE HEART.

One other set of observations deserve notice.

In the first stage, when the face is flushed, if the pulse be counted, it will be found that the heart, which makes the pulse beat, is working with extreme rapidity.

This rapidity extends through the first, through the second, and into the third stage.

The amount of extra work thus thrown upon the heart is enormous. It varies with the quantity of Alcohol that has been imbibed.

Dr. Parkes found that taking the average number of beats of the heart in 24 hours as 106,000, in a person supplied with water only as drink, the increased beats of the heart produced by Alcohol were, as follow, in the same period of time:

From one fluid ounce of Alcohol the heart beat 4,300 times more.

From two fluid ounces 8,172 times more.

From four fluid ounces 12,960 times more.

From six fluid ounces 18,432 times more.

From eight fluid ounces 23,904 times more.

From eight fluid ounces (on following day) 25,488 times more.

The amount of overwork done by the heart of the man on whom these experiments were made was calculated in foot tons as follows:

The daily work done by the heart up to the period when six fluid ounces were taken, was an average excess equal to lifting 15.8 tons one foot.

In the two days when the eight fluid ounces of Alcohol were taken the average extra work done by the heart each twenty-four hours was equal to the task of lifting 24 tons one foot.

[*The Teacher may here find good opportunity for illustrating this extra work of the heart from Alcohol. He may reduce the tons to pounds or ounces, and explain the labor which would be performed by the hand in lifting each pound or ounce one foot until the whole were raised.*]

It is no wonder that those who indulge, during a night's revelry, in large quantities of alcoholic drinks feel next morning exhaustion and depression, commencing, as they indicate, at the heart.

PART II.

HOW ARE THE EFFECTS OF ALCOHOL PRODUCED?

The answer to this question is conveyed to the mind very clearly in that part of the Subject already given, where the effect of the agent on the circulation of the blood through the small vessels is described.

It is also given in that part where the stupor and insensibility and loss of power are described; that is to say

in the account rendered of the phenomena or signs observed in the third and fourth degrees or stages.

It is the effect of Alcohol to relax the minute blood-vessels, upon which the resistance to the stroke of the heart is reduced.

Upon that reduction of resistance, the recoil or spring of the arteries is reduced.

Owing to this loss of resistance the heart, like a clock with its pendulum shortened, works away with extra rapidity.

Under such circumstances all the circulatory system is thrown out of order; the minute vessels, and the vital organs which they supply, are congested or unduly filled with blood.

As the result of these changes the general inactivity and feebleness of mind and body, ending in complete want of power and insensibility, are produced.

Thus Alcohol is a universal relaxant and reducer of power.

Alcohol, from this power which it has of causing loss of tone to the circulating system, with congestion of the brain and other nervous parts following the loss of tone, is, indirectly, a narcotic.

Again, from the irritation which it produces as it comes into contact with delicate surfaces, like the surfaces of the intestines and stomach, Alcohol is what is called a local irritant.

SUMMARY.

In summary, then, the effects caused by Alcohol are due to three special actions which it exerts upon living bodies.

1. To relaxation of muscular fibre generally, and of the muscular fibre of the minute arterial vessels specially.

2. To congestion of the brain, and other vital organs, as a result of the vascular relaxation.

3. To irritation produced by its direct local action upon sensitive parts.

Alcohol is thus definable, as :

A relaxant, a narcotic, an irritant.

PART III.

ARE THE EFFECTS PRODUCED FOR GOOD OR FOR EVIL?

The answer to this question is conveyed in every word that has been said in the course of the lesson.

It is common-sense itself that nothing but evil of the most serious kind can arise from the effects of Alcohol when it produces its second, third, and fourth stages.

The most fanatical person in favor of Alcohol will not, probably, dispute this position.

The question, therefore, is brought down to the point whether any good can result from the production of the *first stage*.

The evidence on this point is against the presumption of good being produced, except when the agent is skilfully used as a medicine.

1. Because even the first stage is one of feverish excitement and waste, leaving depression behind. It is like the hectic fever of consumption.

2. Because the excitement supplies nothing that benefits the body or mind.

3. Because the excitement, indulged in many times, creates a habit and a craving for the agent the bad end of which is easily foreseen.

4. Because all the evils connected with the induction of the after and more fatal stages commence with this first stage.

The result of the argument, consequently, is clear enough. It may be stated in two sentences.

The effects produced by the habit of taking Alcohol tend altogether to physical evil.

Let no one be tempted by the experience of the effects of the first stage of poisoning by Alcohol, to lapse into the second, or into the still more dangerous third and fourth.

SUBJECT V.

ALCOHOL AND PHYSICAL WORK.

INTRODUCTION.

In this Subject it is proposed to consider how far the use of alcoholic drinks affects physical or muscular work.

The common opinion of persons who are disposed by habit or prejudice in favor of alcoholic drinks, is that such drinks are essential to the performance of hard muscular work.

There are no opinions more commonly expressed in every-day life than such as these :—

“Wine, beer, and other strong drinks give strength.”

“Take a glass of beer, or stout, or wine, to get up your strength.”

“Carry a supply of these drinks to keep up your strength.”

We have to consider if these suggestions are valid.

Explain that the Subject will be divided into three parts, including :—

- I. The physiological aspect of the subject.
- II. The practical aspect.
- III. The inferences derivable from the physiological and practical aspects.

P A R T I.

THE PHYSIOLOGICAL ASPECT.

It is a well-observed fact which everybody sees who cares to see, that when a person is coming under the influence of wine or alcoholic drink there is some aberration in muscular precision and action.

It is a commonplace joke amongst commonplace drinkers to say to a person, if his hand be unsteady, that he has been taking a drop too much.

Almost every erratic movement which a person is seen to make is, good-naturedly, attributed to drink.

This is so striking that even persons who exhibit paralyzed movements from disease, or irregular movements like those from St. Vitus's dance, are often supposed, at first sight, to have been indulging in drink.

If a person fall in the street in a fit it is frequently imagined that he has been drinking.

These observations all tend to show that there is no real belief resting on sound evidence in favor of alcoholic drinks giving strength.

Carefully examined, all such modes of expression imply that strong drinks impair or destroy accurate muscular motion.

That this view is correct is shown by the physiological observations that have been made in respect to the action of Alcohol on muscular fibre.

The Author of these notes once conducted a series of experiments intended directly to bear upon this inquiry.

In the research he first observed that Alcohol produces the following four degrees or stages:—

1. Of vascular and muscular excitement.

2. Of emotional excitement.
3. Of mental and bodily intoxication.
4. Of absolute intoxication. Dead drunkenness.

He then inquired what, during these stages, from first to last, was the increase or decrease of muscular power.

Whether there was an increase of power during the first stages of action.

Whether the acknowledged decrease of muscular power in the later stages took place during any part of the first and second degrees or stages.

In making this inquiry he took measurements of muscular power when the muscles were not under the influence of Alcohol, and when they were under various degrees of influence.

The result was to show that in the first stage of alcoholic action, although there was great excitability of muscle, there was actually a reduction of contractile power, and that this reduction rapidly increased as the second stage advanced.

He further observed that when the muscular power was arrested by overweighting it, it could overcome the overweight if stimulated into action by a gentle electric current, when the muscles, and the nerves supplying them, were not influenced by the action of Alcohol.

But that when the muscles were influenced by Alcohol, even in the first stage of action, the same degree of electric excitation would not call forth the muscular contractile power.

From these facts he came to the conclusion that Alcohol acts detrimentally on muscular motion, not only through the effects it produces upon the nervous system, but from its direct action upon the muscular fibre itself.

Dr. Ridge, in a series of beautiful experiments, has recently shown how the precision of muscular action is also interfered with by Alcohol.

He demonstrates that when the body is under the influence of Alcohol in the first stage, the fingers are incapable of estimating balances with the precision which they possess when the body is free from Alcohol.

He shows that the sensitiveness of touch from the fingers resting upon sharp metallic points is much less refined when the body is under the first stage of Alcohol, than when it is free from Alcohol.

He shows that the eye is not so capable of adapting itself to see objects clearly and accurately, at a short distance, when the body is under the first stage of Alcohol as when it is free from Alcohol.

Thus the physiological evidence is strongly in favor of the view that muscular or physical work is reduced in activity and permanency by the influence of Alcohol in all stages of its action.

Other observers have commented on similar evidences derived from various works of skill and competitive feats of skill, as in walking, rowing, cycling.

In competition for prizes at rifle practice, the most successful skill has been that which was performed by those who have abstained from alcoholic drinks.

[The Teacher will find opportunity here to give many other effective illustrations relating to feats of skill in various competitions.]

PART II.

THE PRACTICAL ASPECT.

We may now turn to the practical side of this subject, and inquire, by reference to well-authenticated

facts, whether every-day experience supports or refutes the physiological view stated above.

Dr. W. B. Carpenter, the distinguished author of so many works on physiology and the allied sciences, relates, in the 48th number of the *British and Foreign Medical Chirurgical Review*, the following facts on brick-making, supplied by a gentleman living at Uxbridge:—

“ In the year 1841, I obtained the amount of bricks made in our neighborhood by our largest maker; and the results in favor of abstainers from Alcohol—teetotalers—was very satisfactory.

“ Out of upward of twenty-three millions of bricks made, the average per man, made by the beer-drinkers in the season, was seven hundred and sixty thousand two hundred and sixty-nine; whilst the average for the teetotalers was seven hundred and ninety-five thousand four hundred, which is thirty-five thousand one hundred and thirty-one in favor of the abstainers.

“ The highest number made by a beer-drinker was eight hundred and eighty thousand. The highest number made by a teetotaler was eight hundred and ninety thousand, leaving ten thousand in favor of the teetotaler.

“ The lowest number made by a beer-drinker was six hundred and fifty-nine thousand; the lowest number made by a teetotaler was seven hundred and forty-six thousand, leaving eighty-seven thousand in favor of the teetotaler.

“ Satisfactory as the account appears, I believe it would have been much more so if the teetotalers could have claimed the whole gang as abstainers, as they were very frequently hindered by the drinking of some of the gang, and when the order is thus broken the work can not go on.”

The following statement by Mr. (afterward Sir) Wm. Fairbairn, the eminent engineer of Manchester, when at the head of a firm employing between one and two thousand workmen, is given in the Sanitary Report for 1840:—

“I strictly prohibit on my works the use of beer or fermented liquors of any sort, or of tobacco. I enforce the prohibition of fermented drink so strongly, that if I found any man transgressing the rule in that respect, I would instantly discharge him without allowing him time to put on his coat.”

The reasons for these measures are thus stated:—

“In those foundries in which there is drinking throughout the works all day long, it is observed of the men employed as workmen, that they do not work so well; their perceptions are clouded, and they are stupefied and heavy. I have provided water for the use of the men in every department of the works. In summer-time the men engaged in the strongest work, such as the strikers to the heavy forges, drink water very copiously. In general the men who drink water are really more active and do more work, and are more healthy, than the workmen who drink fermented liquors.”

The following is the published testimony of Mr. Josiah Hunt, a well-known agriculturist in Gloucestershire, as to the efficient performance of harvest work on the abstinence system.

His experiment is especially valuable as showing the positive advantage gained by the substitution of articles of solid food for alcoholic liquors of equal cost—a point of great economic importance to the laboring classes.

After mentioning the terms on which his work had been done in former years (namely, eight shillings and sixpence per acre, and an allowance of three gallons of

cider, or an additional payment of three shillings per sack), Mr. Hunt continues:—

“I let eighty acres of grass to mow, harvest, and stack, to four of those who did the like last summer, with three others, at eight shillings and sixpence an acre in money; and instead of three shillings an acre for drink, an equal sum to be expended in the purchase of unintoxicating drink and food, on condition that neither of them should taste any fermented liquor during the progress of the work. Three of the men had signed the pledge in the previous winter, the other four did so about a fortnight after they began to work.

“They commenced on the 10th of June and finished on the 26th of the next month, which was longer by two weeks than they would have been if the weather had proved fine. The whole of the work, without the least exception, was performed more to my satisfaction than ever was the case before.

“During the progress of the work they gave abundant proof that they were equal to as much work as any seven men in the neighborhood; and also to as much as they themselves had been equal to at any time whilst taking intoxicating drinks.

“They were not picked men; four of them, about the respective ages of 55, 41, 30, and 29, had worked for me for several years, and the others, aged 41, 30, and 20, had been engaged at various times in the spring without any intention of being retained during the summer; and that they were not of more than average strength may be inferred from the fact that I was told before they began—‘We know very well how your experiment will end; for there are but two men out of the seven that can do a day’s work. They will be knocked up before they have mowed two hours.’

“At the end of the first day’s mowing it was, how-

ever, found that they had done more than any other men in the neighborhood ; and as they thus proceeded without being 'knocked up,' the tables were turned, and I was then told that they performed so well in consequence of their good living.

" How this was obtained I propose presently to show ; but before doing so I must, in justice to the men, add that their conduct during the summer has presented a striking contrast to much that I have witnessed in ale and cider drinkers. I have not heard any improper expressions escape either of them during the whole period, and their general behavior has been very creditable.

" Instead of intoxicating drink, they used tea and cocoa, sweetened with sugar or treacle and skimmed milk. The following are the quantities used, with the cost, viz.: 2 lbs. of tea, 22 lbs. of cocoa, $31\frac{1}{2}$ lbs. of sugar, $4\frac{1}{2}$ lbs. of treacle, and 60 gallons of skimmed milk, all of which cost three pounds twelve shillings, instead of (as at the rate of the cider last year) twelve pounds.

There thus remained eight pounds eight shillings to expend in food, and for one shilling more than this sum, or eight pounds nine shillings, they were enabled to procure the following, viz.: one hundredweight of beef, one hundredweight of bacon, four sacks of potatoes, and one sack of flour, with twenty pounds of suet for puddings ; all of which 'good living,' be it remembered, was obtained out of the saving effected by the substitution of an un-intoxicating drink for the intoxicating and expensive one of the previous summer."

Among other documents published by Dr. Carpenter, was a letter from a "Moulder" in the Gorbals' iron foundry at Glasgow, containing the following statement : "I can assure you that temperance men can do more work and better work than those who use or indulge in

spirituous liquors of any kind. I joined the Total Abstinence Society eleven years ago; and from that day to this hour I have abandoned the use of spirituous drinks; and the happy result has been that I am better in health and abler for work than when I was indulging in the use of those delusive liquors."

"From Rotherham we have the testimony," continues Dr. Carpenter, "of one hundred reformed drunkards of various occupations; among them that of S. S., who has been a teetotaler now about seven years, and whose work is moulding iron plates, for spades and shovels, which is, taking it throughout the day, one of the hottest and most laborious occupations known."

We have received from Leeds the testimony of thirty-four men (and we are assured that many more might easily have been obtained), whose signatures are appended to the following statement: "We, the undersigned, having practiced the principles of total abstinence from all intoxicating liquors, for the several periods stated below, and having during that time been engaged at very laborious occupations, voluntarily testify that we are able to perform our toil with greater ease and satisfaction to ourselves (and we believe more to the satisfaction of our employers also) than when we drank moderately of these liquors; our general health and circumstances have also been considerably improved."

Of these men, twelve belonged to the class whose occupations are commonly regarded as peculiarly trying; seven of them being furnace-men at foundries and gas works, and two of them sawyers, one a whitesmith, one a glass-blower, and the last a railway night-guard. The duration of the periods of abstinence of these men ranged from one to ten years.

The following was the experience of a wood-sawyer

of Glasgow, whose very well-written letter received, as deserved, warm approbation :

“ I have wrought at this laborious employment for twenty-six years in the city of Glasgow, fifteen years of which I was under the fatal delusion that these liquors were strengthening, and that my hard work required that I should use them for the purpose.

“ I joined the Total Abstinence Society eleven years ago, and from that day to this hour I have abandoned the use of these drinks, and the happy result has been that I have been enabled to endure more fatigue, do my work better, and do more of it, than when I was indulging in the use of these delusive liquors.”

The following is another very striking testimony given by a nail-maker at Glasgow :

“ I have been a teetotaler these five years, and though I previously believed that strong drink was necessary to aid me in my work, yet since I have become an abstainer I find hard work easier and long hours more readily to be endured. I am also one of the Glasgow Fire Brigade and was once at a great fire at Mr. Thompson’s mill for seventy-three hours in succession, with nothing but coffee and ginger-beer, and endured, while all my comrades were beat and fell away.”

The following instance related to Dr. Carpenter by the very best authority (an officer of the regiment) proves that our English soldiers in India not only do not suffer from, but are absolutely benefited by, total abstinence from ardent spirits during marches.

“ In the early part of the year the 84th Regiment marched by wings from Madras to Secunderabad, a distance of between four and five hundred miles. They were forty-seven days on the road, and during this time the men were, practically speaking, teetotalers. Pre-

vious to leaving Madras, subscriptions were made among the men and a coffee establishment was organized.

“Every morning, when the tents were struck, a pint of hot coffee and a biscuit were ready for each man, instead of the daily morning dram, which soldiers on the march in India almost invariably take. Half way on the day's march the regiment halted, and another pint of coffee was ready for any man who wished it.

“The regimental canteen was opened only at ten and twelve o'clock for a short time, but the men did not frequent it, and the daily consumption of arrack for one wing was only two gallons and a few drams per diem, instead of twenty-seven gallons, which was the daily Government allowance.

“The Commanding Officer employed the most judicious precautions to prevent the men from obtaining *arrack*, a strong alcoholic drink, in the villages on the route, and his exertions were effectively seconded by the zealous co-operation of the other officers, and by the admirable conduct of the majority of the men, who were fully persuaded of the noxious influence of ardent spirits during exercise in the sun.”

The results of this water system were shortly these :

“During the whole march the regiment had not a single prisoner for drunkenness.

“Although the road is proverbial for cholera and dysentery, and passes through several unhealthy and marshy districts, the men were free from sickness to an extent absolutely unprecedented in our marches in India ; they had no cholera and no fever, and lost only two men from dysentery, both of whom were old chronic cases taken out of hospital at Madras. With these exceptions there was scarcely a serious case during the whole march.

"The officers were surprised to find that the men marched infinitely better, with less fatigue, and with fewer stragglers than they had ever before known, and it was noticed by every one that the men were unusually cheerful and contented. There could not be a more convincing proof that the stimulus of spirits is quite unnecessary in the tropics, even during great bodily exertion and fatigue."

[*The Teacher can supplement the above illustrations by any other experiences he may have at command, or can replace any of the above by his own. Those supplied have been selected specially, first, because of their aptness for varied illustration, and secondly, because of the distinguished and unbiased authorities, Dr. Carpenter and the late Sir John Forbes, by whom they were collated.*]

PART III.

INFERENCES DERIVABLE FROM THE PHYSIOLOGICAL AND PRACTICAL ASPECTS OF THE SUBJECT.

The inferences deducible from the physiological and practical data given above are clearly to the effect:—

1. That work requiring the most delicate care and accurate precision is best carried out without alcoholic stimulation.
2. That the hardest physical work is best carried out without alcoholic stimulation.
3. That work requiring the most endurance is best carried out without alcoholic stimulation.

SUBJECT VI.

ALCOHOL AND ITS EFFECTS ON THE MIND

INTRODUCTION.

In this Subject it is proposed to consider the effects of Alcohol on mental work, on mental health, and on the organ of the mind, the brain.

There are many persons who are ready to admit that although Alcohol may not be a food; although it may not supply any structure-forming food; although it may not be a food that supplies material for combustion in the body and for sustaining vital power; and although it may not be capable of taking the place of water as a drink:—still it is a stimulant, and in that way is, as it were, a food for the mind.

Other persons will argue that although Alcohol may not be a food in the material sense stated above, it is still necessary for those who are of a sleepless, nervous nature, or are over-anxious, or are subject to much anxiety, as well as for those who, being accustomed to it, are timid, lest in leaving it off they should give up what has long seemed to them to be a necessary part of their daily subsistence.

There are still more persons who, admitting freely that Alcohol is not in any sense a food, hold that it is necessary as a luxury.

They quote Sir Walter Raleigh to the effect that wine, though bad generally, is good for *recreative occasions*.

On such occasions Alcohol should be taken to make glad the heart.

There its action should stop, and then it is a blessing.

There are many who urge that while alcoholic drinks may do great harm to uncultivated people, they are not likely to be used by the educated or by those who are gifted with great mental ability. Education, therefore, is, they think, a certain cure for all evils which may spring from the use of alcoholic drinks as beverages.

Explain that the Subject will be divided into five parts.

Part I. Alcohol as a stimulant for the mind.

Part II. Alcohol as a stimulant for sleepless, anxious, and nervous people.

Part III. Alcohol for recreative occasions.

Part IV. Alcoholic proclivities and mental education.

Part V. Summary and conclusion.

P A R T I.

ALCOHOL AS A STIMULANT FOR THE MIND.

The argument that Alcohol is necessary as a stimulant to the mind stands first for consideration.

If it were true that under the stimulus of Alcohol, or any similar agent, the mind was forced to the performance of an unnatural amount of work, one of two things would necessarily happen,—

Either the work would not be good;

Or, if the work were good, the mind would be overtaxed, which would mean ultimate shortening of mental work, and almost of necessity injury to the body.

Life at its best is so ephemeral in its course it is difficult to do more than extract two or three great mental works out of it through all its stages.

What, then, can be the true value of that mental work, which, unattainable by natural means, is forced by a stimulation which is at once wearing, wasting, and wanton?

“Wanton waste makes woful want,” is a saying as true in regard to mental economy as it is to ordinary economy.

Again, stimulation of the brain by Alcohol is physically bad for the brain as the organ of the mind.

When the brain is excited by Alcohol it is surcharged with blood.

If, then, owing to an increased supply of blood to the brain, thought is more rapid and energetic, there is merely a fight against time, because the brain is exhausted more quickly, has to be wound up more frequently, and wears out more speedily.

Once more, great rapidity of thought leads to admixture and confused blending of ideas.

In the instrument called *the wheel of time*, we discern, easily enough, the different colors which are to be seen in the wheel when the motion of the wheel is moderate. But when the motion is rapid we see only one color.

It is the same in the wheel of thought.

When the wheel of thought, so to speak, spins too rapidly,

Then imagination, memory, judgment, feeling, order, expression run into each other, causing confused ideas meaningless labor, irritable exhaustion.

These facts are often well illustrated in post-prandial speeches over wine, when the speaker gets into what is called a fog ;—

And when he makes matters worse in trying to make them better, by taking a little more Alcohol.

Once more, there is the well-observed fact that the men and women who while at work—

Do most work,

Do best work,

Do hardest work,

Do soundest work,

And, in the end, do quickest work,—

Are those who, avoiding alcoholic stimulants under all contingencies and pressures,—

Trust to rest and to natural food for the power that is required.

Side by side with these facts is another equally striking experience. It is this :—

That men who break down at mental work ;

That brilliant men "whose suns go down at noon,"—Are often men who, undertaking laborious mental work, subject their brain, systematically, to alcoholic stimulation.

A series of final evils, springing from the physical action of Alcohol, attach themselves to mental workers who indulge in Alcohol, namely :—

The dose of Alcohol which spurred the thought of to-day to a certain pitch must be increased in future days to produce the same effect.

So the evil goes on until the moderate, almost harmless dose, becomes a poisonous dose.

So work becomes impossible without the poison.

Then the poisonous action soon begins to extend from the brain to other organs of the body.

On which the other organs, such as the heart, and

liver, and kidneys, already reduced in nervous power from brain exhaustion, fail in function.

Thus, of all men, brain workers are least able to bear up against the injuries inflicted by Alcohol.

PART II.

ALCOHOL AS A STIMULANT FOR SLEEPLESS, NERVOUS, AND ANXIOUS PEOPLE.

It is constantly contended that those persons who are naturally sleepless, nervous, easily excited, and easily made anxious, are of such peculiar mental constitution, that for them the stimulus of Alcohol is absolutely necessary.

Some very wise observations on this subject were made by the late Dr. Cheyne, of Dublin.

“Nervous people,” he says, “generally entertain a notion, that when strength is exhausted by want of sleep, it may best be recruited by wine; but this is a strong delusion, as I was first led to suspect by the result of a long journey, which I once made in the Mail Coach, while in a state of great anxiety.”

“I travelled,” says Dr. Cheyne, “nearly seven hundred miles, almost without stopping, having been five nights out of six in the coach, during which time I could not have slept half as much as usual, and the sleep I obtained was unsound and interrupted.

“During the whole time I lived chiefly on bread and tea, with a small portion of animal food once a day. I drank no malt liquor, wine or spirits, and at the end of my expedition I was scarcely more exhausted than when I set out.

“During the journey I had several opportunities of seeing persons who gorged themselves two or three times a day, and guzzled as much as the time while the carriage halted would permit them to do, completely worn out by journeying for one or two nights.”

“If any one” (Dr. Cheyne adds) “has to travel by night, or sit up to watch a sick friend, let no other preparation be made than what is necessary to secure freedom of the circulation, and the warmth of the body, by relaxing every ligature, putting on a pair of Connemara stockings, and wrapping himself in a cloak. He will then find himself in the morning, after he has sponged his body (if he is in the habit of so doing), changed his linen, and taken a cup of good black tea, fit for the business of the day, which, on the other hand, will prove exceedingly irksome, if during the night he has been drinking wine and water.

“Many an unfortunate sick-nurse has been made a drunkard, by the mistaken kindness of her employers, who give her wine and spirits to keep up her strength, while, in truth, the only certain effect of strong liquor is to incapacitate her from attending to her business, at the same time that it gives rise to a habit which ends in her being discarded by them, perhaps to her utter ruin.”

It is almost impossible to add anything that will increase the force of these wise observations and admonitions of Dr. Cheyne.

The fact is that there are no natures on which the action of Alcohol is more deleterious than the natures of nervous and over-anxious people.

Excessively timid, they often, against their own knowledge and self-consciousness of what is good for them, continue to take Alcohol because they fear to give it up.

They, consequently, are most disposed to come dangerously under its influence.

Amongst persons of this class the mental state is so peculiar, so special, that it often leads to speciality of choice of and trust in one exclusive form of alcoholic drink.

Thus one person of the class will pin his faith exclusively to brandy, another to sherry, another to whisky, under the idea that some particular virtue pertains to the particular drink.

Amongst this class we find it the most difficult task to persuade the members of it to desist from Alcohol, even when it is obviously and confessedly doing them the greatest physical and mental harm.

They make an attempt to abstain when the injury from drink stares them in the face, and hold on for a certain time.

Then, under some little pressure, such as the performance of some painful or disagreeable duty, they rush back to their old enemy, and, as they say, "fortify themselves," which means, disqualifying themselves once more for what they have to do.

These are the people who go about saying that total abstinence has proved a failure in their case. "They want something to keep them up."

But in fact the more they want something to keep them up, and the oftener they get that something, the quicker they go down.

They usually become the most helpless victims of alcoholic poisoning, if they can not be restrained from the poison altogether.

The members of this class are, as a rule, sleepless, and constantly they resort to drink at night before courting sleep.

Thus they get into the habit of finding a disturbed sleep under the influence of the Alcohol.

It is never a perfect or refreshing sleep ; but, in time, it seems never to come without the stimulant.

So the habit of putting on the alcoholic night-cap begins to be necessary, and another dangerous habit is added.

Speaking, then, of this sleepless, nervous, and over-anxious class, altogether, the evidence is most clear on the following points :—

1. That they, of all people, are least capable of holding up against the insidious action of Alcohol on the organ of the mind.

2. That they, of all people, should be protected from the seductive and pernicious influence of alcoholic drink.

PART III.

ALCOHOL FOR RECREATIVE OCCASIONS.

The class of persons who maintain that Alcohol should only be used for recreative occasions, employ an argument which is extremely seductive, and which leads many astray, especially the young.

The seducers are usually persons themselves of great strength of mind who can play with the tempter, pushing him aside when he is in their way and they want to be wise, but calling him when they want to be merry and not too wise.

These persons are, what is called, of a hard and firm nature.

They have no mercy on those who can not control themselves.

They believe that every one can exert self-control as they themselves can.

So they bring out wine at the feast and on all merry occasions; use it freely, and afterward put it aside until a new festive or other opportunity suggests that they should call for it again.

The argument these persons use seems specious, but it is an argument which, of all others, is of the most dangerous character.

The argument, if it were true, would apply to a very limited class of persons indeed, for not one person in twenty is so constituted as to come safely under its direction.

The argument, therefore, is one in favor of the use of alcoholic drinks, propounded by those who, of all others, are most likely to be listened to, and who ought to be the best guides and directors against the use of pernicious drinks by the multitudes of weaker and less determined wills.

Used by the strong it has the pernicious effect of leading the irresolute to avail themselves, by example, of every possible opportunity that can be found for resort to Alcohol under the plea of recreation.

Every rest from business is considered a recreation.
It is necessary to recreate before going to business.
It is necessary to recreate during business.
Every holiday must be a double or treble recreation.
And every recreation must be an excuse for drink.
So, in a journey, at all important stoppages :—
In study or business, at all important periods of leisure:

At all periods of rest from labor :
At all meetings of a social kind :
At all games and exercises :
In all competitive contests, mental and physical :--
Resort must be had to alcoholic drinks because the occasion is recreative.

The same evil argument ruins what is called hospitality.

It is recreative to receive a friend or friends.

But because it is recreative, it is necessary to treat that friend with wine or some other form of alcoholic beverage.

The friend may not in the slightest degree want it.

It may be very bad for him.

He may particularly desire not to take it.

But it is the time for it to be offered and accepted.

So the host must offer it whether he would or not.
And the friend must take it whether he likes it or not.

PART IV.

ALCOHOLIC PROCLIVITIES AND MENTAL EDUCATION.

The last argument we have to consider relates to the often stated belief that indulgence to a dangerous extent in alcoholic liquors is the mere result of ignorance, and that with an increase of education there would be such a decrease of intemperance that all extreme and arbitrary measures for the suppression of intemperance would be unnecessary and, indeed, unwise.

This argument is altogether fallacious.

It is not based on any correct reading of natural facts.

As a matter of evidence the desire or craving for Alcohol, in those who have once begun to taste of it and to be led away by it, is soon as strongly developed in the educated as in the uneducated classes.

This fact is daily becoming more distinctly recognized

as the details relating to inebriates are collected and classified.

Dr. Lewis D. Mason's statistical report on 252 cases of inebriety treated at the Inebriates' Home, Fort Hamilton, Long Island, may be quoted with effect in proof of the fact that education of itself is no sufficient safeguard against inebriety.

Dr. Mason states (*Report from Quarterly Journal of Inebriety, 1881*) in reference to 252 examples of inebriates who were under his care from November 1, 1879, to September 10, 1880, the following remarkable figures and facts:—

“Fifty-five, or nearly one-fourth, had received a liberal education, one in fourteen having had a collegiate course; of the males about one in eleven had followed professions; a large proportion were skilled mechanics; and, of those engaged in business, none were below medium in point of general intelligence and capacity. Many exceeded this point, that is to say, they were above mediocrity.

“We have at present,” says Dr. Mason, “among our patients, clergymen, lawyers, physicians, and representatives from all classes of society—who once held remunerative and responsible positions, but who now, in many instances, voluntarily seek the shelter and restorative aid which our asylum affords.

“The fact that dipsomaniacs come from the more intelligent and educated classes of society is substantiated by these records. The occupations of 208 males were trades (outdoor) 73; trades (indoor) 48; clerks, 35; professionals, 18; liquor business, 16; merchants, 11; no occupation, 5; manufacturers, 2.”

The above details are of strictest value because they are based on information systematically collected; the experience of history as well as the experience of every

day life unfortunately confirms them to the letter, and proves the sad truth that education of itself is no check to a course of intemperate life.

[The opportunity is left for any further illustration derived from the knowledge or experience of the Teacher.]

PART V.

SUMMARY AND CONCLUSION.

THE ARGUMENTS:—

That Alcohol is necessary for mental work.

That Alcohol is necessary for sleepless, nervous, and over-anxious people.

That Alcohol may be safely used for recreation.

That Alcoholic proclivities are corrected by education:—

ARE ALL FALSE ARGUMENTS.

ON THE OTHER HAND THE EVIDENCE IS CLEAR,—

That the abstaining man or woman—

Is the best mental worker;

Goes through trials most easily, and surmounts them least impaired;

Enjoys rational recreations, friendships, and hospitalities given and taken, with most satisfaction;

Is best fitted for receiving and advancing education.

SUBJECT VII.

ABSTINENCE, HEALTH, AND LONGEVITY.

INTRODUCTION.

In this Subject it is proposed to show that health and longevity are best sustained under abstinence from alcoholic drinks.

Up to within quite recent times it has been a prevailing notion that health and longevity could not be sustained without resort to alcoholic beverages.

Mr. Raper told a large audience of young men, quite recently, that he remembered the time when, under the influence of this opinion, insurance offices refused to accept the lives of persons who were "foolish enough" to abstain from intoxicating drinks.

We will try to show that the truth lies in the opposite direction.

Explain that the Subject will be divided into three parts, showing:—

I. That, on physiological grounds, health and longevity are most compatible with abstinence from strong drinks.

II. That the same view is maintained by the best facts of practical observation and experience.

III. That the relinquishment of alcoholic beverages has turned out to be useful in many instances where Alcohol was thought to be beneficial and necessary.

PART I.

PHYSIOLOGICAL REASONS FOR HEALTH
AND LONGEVITY FROM ABSTINENCE.

The physiological evidence bearing upon the relationship of Alcohol to life, is that the whole action of Alcohol, when it produces any distinct action, is to cause derangement of animal function.

The study of the physiological action of Alcohol in its relation to food suggests the following views:—

That all foods which are truly natural have for their duty to build up and sustain the body ; or to warm and give force to the body ; or to take the place of a natural drink.

But Alcohol does not build up, sustain, nourish.

It does not give animal warmth or strength.

It does not assuage thirst or act as a natural drink.

Nature gives us all the foods we want ready for use, so that we need not manufacture one.

Alcohol, though it may be accidentally produced in a natural way, is so produced on such a small scale, that it must be manufactured artificially by man on a much larger scale, and at a loss of much real food, in order to be of any service.

Thus Dr. Edmunds has shown, very correctly, that loaf or cane sugar yields, by fermentation, about 51 per cent. of Alcohol. "There is in brandy," he says, "exactly the same percentage of Alcohol as that which is yielded by sugar, and therefore a pound of sugar is equal in thermic power to the Alcohol in a pound of brandy."

Dr. Edmunds further states, that "water containing sugar in percentage equal to that of the Alcohol in

brandy or any other alcoholic liquor, would contain an equal measure of thermic power."

But whether Alcohol is, like sugar, oxidized in the body with production of vital heat, is a doubtful point altogether. Taken in very small excess Alcohol reduces animal warmth and power.

Nature supplies us with no food which produces a craving for itself. When we have partaken of her foods we are sufficiently satisfied.

Alcohol when partaken of for a short time, even in moderation, creates a craving or desire for itself, which is apt to pass into an actual insanity.

Alcohol acts upon the body in the same manner as other chemical narcotic agents.

It produces,—in the same way as chloroform, nitrous oxide gas, and some other chemical substances,—a distinct series of stages, during its action on the body.

These stages are four in number.

One of simple excitement and flushing.

A second of continued excitement, with some confusion of mind and manner.

A third of excitement attended with great confusion of thought, imperfect movements, coldness, and insensibility.

The fourth attended with complete prostration, extreme coldness, and deep insensibility.

The great Sir Humphrey Davy, in his "Researches, Chemical and Philosophical," relates the following experiment, which illustrates forcibly the action of Alcohol in its various stages of action upon the body.

Sir Humphrey, comparing the action of nitrous oxide, or laughing gas, with that of Alcohol, says:—

"It occurred to me that, supposing nitrous oxide to be a stimulant of the common class, it would follow that the debility produced in consequence of excessive

stimulation by a known agent, ought to be increased after excitement from nitrous oxide.

“To ascertain whether this was the case, I made on December 23d, at 4 P.M., the following experiment:

“I drank a bottle of wine in large draughts in less than eight minutes. Whilst I was drinking I perceived a sense of fulness in the head, and throbbing of the arteries, not unanalogous to that produced in the first stage of nitrous oxide excitement. (First Stage.)

“After I had finished the bottle, this fulness increased, the objects around me became dazzling, the power of distinct articulation was lost, and I was unable to walk steadily. (Second Stage.)

“At this moment the sensations were rather pleasurable than otherwise. The sense of fulness in the head soon, however, increased, so as to become painful, and in less than an hour I sunk into a state of insensibility. (Third Stage.)

“In this situation I must have remained for two hours or two hours and a half. (Fourth Stage.)

“I was awakened by headache and painful nausea. The nausea continued even after the contents of the stomach had been ejected. The pain in the head every minute increased. I was neither feverish nor thirsty; my bodily and mental debility were excessive; and the pulse feeble and quick.”

These are the acute effects of alcoholic drink on man. They occur when a person first indulges in such drinks.

But the same effects are represented on a vast scale on whole populations, because Alcohol acts on men generally as on men individually, and in an insidious and slow as well as in a rapid manner.

Thus in communities where alcoholic beverages are freely taken, there are four distinct populations, who represent the four stages above stated.

There is a population which, every day, is under a stage of excitement.

There is a population which is under more than ordinary excitement; which is under excitement with loss of power and constant confusion of thought.

There is a population which is always in the third chronic stage of alcoholic life, which feels as if it could not live each day until a poisonous dose of Alcohol is taken. This is an enfeebled population, showing by its bloated face and drowsy manner, by its susceptibility to cold and feebleness, and by its irritation, and, it may be, violence, that the most important changes have taken place in the bodies of those who constitute it. This is usually a short-lived population.

There is a population still more deeply affected by Alcohol, and which, in various ways, is completely stricken down by it. This population has had implanted in it organic diseases of various kinds; it has suffered specially through its nervous system, and presents numerous specimens of complete paralysis or general destruction of nervous power. This population quickly dies.

Thus all the physiological evidence respecting the action of Alcohol is to the effect that the animal functions are deranged, and the animal structures deteriorated, by Alcohol.

And this again means that Alcohol, generally used, is detrimental both to health and length of life, while abstinence from Alcohol favors both.

PART II.

PRACTICAL OBSERVATION AND EXPERIENCE ON ABSTINENCE, HEALTH, AND LONGEVITY.

There is a story told about old Lord Bathurst, the companion of Pope and Swift, which story is thought to be very severe against Total Abstainers, and to be a strong defence of old topers.

When nearly ninety years of age, Lord Bathurst continued, it is said, to drink his bottle of wine. One evening, when he was very unwilling to part with his friends, his son (afterward Lord Chancellor) objected to their sitting up longer, observing that health and long life were best secured by regularity. His Lordship, the story runs, suffered his son to retire, but as soon as he was gone, said, "Come, my good friends, since the old gentleman is gone to bed, we may venture to crack another bottle."

Dr. Cheyne, commenting on this anecdote of Lord Bathurst, observes that it belongs to a class of anecdotes which they, who wish well to their fellow-creatures, can scarcely listen to with patience; but it is wise to be calm when we would correct the errors of others.

"I have been engaged," Dr. Cheyne adds, "upwards of thirty years in medical practice, a great part of the time extensively, and all this while I have been attentively observing men who lived in all respects alike, save in the quantity of liquor which they drank.

"And I can conscientiously affirm, that longevity is more resisted by excess in that respect, than by all the other hurtful influences which prematurely extinguish the lamp of life; insomuch, that were an allegorical personification of the various vices by which men shorten

their lives to be honestly painted, Drunkenness would appear as a bloated giant, while the rest might be represented as obscene or deformed pygmies."

These hard drinkers who live long remind us of a passage in Bishop Berkeley's work on tar water. "Albeit," says the good Bishop, "there is in every town or district in England, some tough dram-drinker set up as the devil's decoy to draw in proselytes."

The author of these notes, from a medical experience as long and perhaps as varied as that named by Dr. Cheyne, confirms these observations in every particular.

In a paper published by the Manchester and Salford Sanitary Association, the authors give the following table, which was drawn up from a large number of instances by the distinguished actuary, Mr. Neison.

In intemperate persons the mortality at 21 to 30 years of age is five times that of the temperate. From 30 to 40 it is four times as great. It becomes gradually less.

A temperate person's chance of living is,	An intemperate person's chance of living is,
At 20..... 44.2 years.	At 20 15.6 years.
At 30 36.5 "	At 30 13.8 "
At 40 28.8 "	At 40 11.6 "
At 50 21.2 "	At 50 10.8 "
At 60 14.2 "	At 60 8.9 "

These deductions have been drawn from observations on 357 individuals, and the facts are well authenticated.

The average duration of life after the commencement of habits of intemperance is:—

Among mechanics, workers, and laboring men.	18 years
" traders, dealers, and merchants.....	17 "
" professional men and gentlemen.....	15 "
" females.....	14 "

Dr. Ridge, in a paper read at a Conference of Medical Men, in the Athenæum, Bristol, 13th October, 1880, gave the following particulars, showing the comparative health of abstaining clubs with those which make no profession on the subject.

Comparison was instituted between several clubs in Preston.

	Members Sick per annum.	Average days per sick member.	Average days per member.
	Per cent.		
Eight General Clubs.....	23·3	53	12 $\frac{1}{3}$
Three Total Abstaining Clubs..	13·9	23	3 $\frac{1}{3}$

The following shows the difference between the abstaining Rechabites and the Oddfellows in the Bradford district during eight years. Of the Oddfellows the average time sick per member was thirteen days, ten hours; and the deaths were one for every forty-four members. Of the Rechabites, the average time sick per member was four days two hours, and the deaths were one for every one hundred and forty-one members.

The late Rev. Stenton Eardley, Vicar of Streatham, London, has given the following particulars respecting a Court of Foresters in that parish.

During the years 1869-75 inclusive, there were on the average one hundred and fifty-two members, of whom nearly one-fourth were Total Abstainers.

The amount of sick pay during those seven years was seven hundred and forty-five pounds, and of this the abstainers' share, if they had been ill to the same extent as the others, should have been one hundred and eighty pounds.

As a matter of fact they only drew fifty-six pounds. In other words, the non-abstainers, though only three times as numerous, had thirteen times as much sickness.

The following is a comparison between the Preston

Sick Union, of the Manchester Unity of Oddfellows, comprising about a dozen lodges in and round Preston (as given in Hardwicke's Manual for Patrons and Members of Friendly Societies, Table II., p. 90), and the London Grand Division of the Sons of Temperance.

Of the Preston Sick Union for five years the average number of members was thirteen hundred and forty-five; the average number of days of sickness of each sick member was 38.50, and the average number of days of sickness per member was 7.7.

Of the Sons of Temperance for seven years the average number of members was twelve hundred and fifty; the average number of days of sickness of each sick member was 27.75; the average number of days of sickness per member was five.

The same facts are proved by the now well-established results of the United Kingdom Temperance and General Provident Institution of London.

This Life Assurance Society has two sections. (1) The General Section, in which about 20,000 sound and healthy moderate drinkers are insured, the intemperate being rigidly excluded; but including, nevertheless, a considerable number who have become abstainers. (2) The Temperance Section, in which about 10,000 strict abstainers are insured.

The following table gives the claims expected according to the tables of mortality employed, and the claims actually made through death:—

Years.	General Section.		Temperance Section.	
	Claims Expected.	Claims Made.	Claims Expected.	Claims Made.
1865-80	— 3,450 —	3,444	— 2,002 —	1,423

“These figures show,” says Dr. Ridge, “that as a result of Total Abstinence over five hundred and fifty

lives have been preserved. Or, to put it the other way, that if those in the General Section had abstained, instead of three thousand four hundred and forty-four claims, only two thousand four hundred and sixty-nine claims would have been made, so that nine hundred and seventy-five more deaths occurred in that period through the use of Alcohol.

“Further evidence in favor of the above stated facts is afforded by the practice of another Insurance Company, namely, the Briton Life Association.

“In this Company, as in the others, the utmost care is taken to exclude all but the most moderate from the list of alcoholic drinkers, so that none except persons strictly temperate are insured in it at all.

“Nevertheless the directors of this Company have felt themselves justified in reducing, by a sum of ten per cent. annually, the premiums of all persons who have been Total Abstainers for two years, on condition that the fact of continued abstinence be made a matter of restatement to the Company from time to time as the directors may require.”

[*The Teacher may illustrate these facts very much further from Dr. Ridge's pamphlet entitled “What shall Medical Men say about Alcoholic Beverages?” Dr. Parkes' Paper “On the Ashantee Campaign”; Dr. W. B. Carpenter's returns, “Mortality of the European Troops of the Madras Army,” or from other sources of information which may be within the range of his own knowledge.]*

PART III.

ON THE RELINQUISHMENT OF ALCOHOLIC BEVERAGES.

One of the commonest arguments against the relinquishment is the danger of a sudden change of habit.

Under this belief, and the practice that springs from it, the worst drinkers are confirmed in their pernicious habit, while moderate drinkers are led to continue the indulgence.

The folly of this argument was admirably set forth as far back as 1725, by the classical medical writer, Dr. Cheyne, of London, in his famous book, "On Health and Long Life."

"Nothing," says Cheyne, "is more ridiculous than the common plea for continuing to drink large quantities of spirituous liquors, because those accustomed so to do think it dangerous to leave off all of a sudden."

"It were as reasonable for him that is fallen into the fire or water to lie there because of the danger of removing him suddenly. For neither element will destroy him more certainly before his time than wallowing in strong liquors.

"If the quantity of strong liquors they have been accustomed to may be supposed prejudicial to their health, or to introduce noxious humors into the habit, the sooner a stop be put to it the better. No man is afraid to forbear strong liquors in an acute distemper, what quantity soever he may have drunk in his health. And yet any sudden change of the humors would not only be more dangerous then, than at any other time, but also would more readily happen and come to pass in such critical cases. And if a person be in hazard by

such a sudden alteration, he can not live long by taking so much poison."

" But the matter of fact is false and groundless. For I have known and observed constant good effects from leaving off suddenly great quantities of wine, and flesh meat too, by those long accustomed to both, am ready to name the persons, and never observed any ill consequence from it in any case whatsoever. Those whose constitutions have been quite broken, and running into dissolution, have lived longer and been less pained in sickness by so doing. And those who have had a fund in Nature, to last longer, have grown better."

The author of these notes has made the same observations in respect to the sudden relinquishment of strong drink in modern times. He has shown that in our prisons the sudden withdrawal of strong drink from the prisoners has not only been unattended by bad effects, but that the greatest benefit to health has followed the relinquishment.

It would be impossible to have better evidence of the absence of danger from sudden relinquishment of alcoholic drinks than is afforded by this one great experiment. The persons who enter our prisons as prisoners, are, of all others, most likely to have been accustomed to stimulants. They are also persons who are frequently in bad health, or destitute. To such, the withdrawal of any necessary foods or supports of life, would be immediately critical, often fatal. But the withdrawal of Alcohol is neither critical nor fatal.

In an equally convincing manner, Dr. Bucke, the Medical Superintendent of the Asylum for the Insane, at London, Ontario, has shown that amongst those whose nervous systems are most weakened by the oppression of mental disease, the general relinquishment of Alcohol is attended with the best effects.

Dr. Bucke has lately made the following report of facts which have come under his own immediate observation and direction :—

“At the time I assumed charge of the London Asylum the average number of patients at that Institution was about six hundred ; these people used about twenty-five hundred dollars’ worth a year of beer, wine, and whisky.

“Now, if Alcohol does any good to feeble people it ought to have done good to these people, for they belonged to the very class who appear to need stimulants the most, and the stimulants were given to them not according to their own notions or feelings as to when they were to take them, and how much they were to take, but by thoroughly competent physicians, who had the patients under observation, either directly or indirectly, day and night.

“Over a year ago I entirely ceased to use beer, wine, whisky, or brandy in the Asylum. About two years ago I began this reform (as I call it). Each month I reduced the number on the list of those who were given beer, wine, whisky, or brandy, watching carefully all the time the effect of the withdrawal of the stimulant.

“I saw nothing to warn me against the course I was pursuing, and something over a year ago I closed the spirit list entirely. No evil consequences have followed this step ; the health of the Asylum was never better—I doubt if it was ever as good as it has been since the use of Alcohol has been discontinued ; the death-rate has fallen slightly ; there has been a larger percentage of recoveries to admissions than there were while Alcohol was being used ; and, in fact, the change seems for the better in every way.”

SUMMARY.

In summary, without putting the slightest strain on the evidence which has been before us, we may draw the three following conclusions:—

I. *That Total Abstinence from alcoholic drinks is favorable both to health and longevity.*

This view is supported by the physiological reasons which have been offered in the first part of this Subject. It is equally well supported by practical argument. It has the advantage, moreover, of being supported by the declared experience of wise and learned men, who have been Total Abstainers.

Thus the late Dr. James Johnson, contrasting the wine and the water drinker, observes:—

“The *water-drinker* glides tranquilly through life, without much exhilaration or depression, and escapes many diseases to which he would otherwise be subject.

“The *wine-drinker* experiences short but vivid periods of rapture, and long intervals of gloom; he is also more subject to disease. The balance of enjoyment, then, turns decidedly in favor of the water-drinker, leaving out his temporal prosperity and future aspirations; and the nearer we keep to this regimen, the happier we shall be.”

II. *That Total Abstinence from alcoholic drinks is favorable to work as well as to health and longevity, and that the periods of life for effective work are thereby prolonged.*

These facts, which appear prominently in the first and second parts of the present Subject, are sustained in a remarkable manner in Colquhoun’s “Treatise on the Police of the British Metropolis,” published in the first year of the present century.

This author says: "On a supposition that the excesses in which perhaps 200,000 of the laboring classes in the Metropolis indulge, shorten the natural period of existence only five years each person, on an average, the labor of one million of years is lost in the lives of this class of men, after the expense is incurred in rearing them to maturity; which, during a period of 36 years adult labor, at £25 a year, establishes a deficiency to the community of twenty-five millions sterling, independent of the numerous other train of evils which arise to a nation from idle, dissolute, and immoral habits."

III. *That relinquishment of alcoholic drinks, by those who indulge in them, is unattended with risk, and is attended with the most favorable results to health and long life.*

SUBJECT VIII.

ON INTEMPERANCE AND DISEASE.

INTRODUCTION.

In this Subject it is proposed to consider what injurious effects upon health and life are produced by indulgence in alcoholic drinks.

Since ever wine and other forms of alcoholic drinks came into use as beverages, it has been a matter of common observation that such drinks produce disease both of body and mind.

The Romans were so conscious of this fact that they prohibited the use of these drinks by youths and women.

The Biblical writers, and many writers amongst philosophers, moralists, and poets, have enlarged on this topic, and have described, in finest language, the dangers incident to indulgence.

[*The Teacher will readily find illustrations bearing out this introductory truth.*]

Explain that the Subject, in its modern and practical view, will be considered in three parts.

- I. The general injuries arising and resulting from intemperance.
- II. The particular injuries arising and resulting from intemperance.

III. The practical inferences derivable from the facts.

PART I.

THE GENERAL INJURIES ARISING AND RESULTING FROM INTEMPERANCE.

The late Dr. Cheyne, of Dublin, gives us a good series of opening texts for this part of our Lesson. He says :—

“ The observation of twenty years in this city has convinced me that, were ten young men on their twenty-first birthday to begin to drink one glass (equal to two ounces) of ardent spirits, or a pint of port wine or sherry, and were they to drink this supposed moderate quantity of strong liquor daily, the lives of eight out of the ten would be abridged by twelve or fifteen years.

“ Yet, this habit is almost universal, although it so frequently disfigures the person, and bloats the countenance—hence the ruby nose and bleared eyes—shortens the wind and blunts the faculties, until bodily and mental exertions become alike irksome. It renders the night restless and unrefreshing, while the latter part of the day is passed in a lethargic state ; so that life at last becoming a burden, such persons are driven to consult a physician.”

“ Strong drink not only weakens the body and mind, but sours the temper, and, at last, destroys every principle of good conduct. I knew a general officer, a man of ability, in his youth just and honorable, who, in middle age, formed an alliance with the brandy bottle, after which he became dishonest and flagrantly mendacious.”

Many who hear these observations will admit at once

the general truth of them, but will be inclined to say they apply only to persons who indulge too freely.

In order to meet this objection let the knowledge of another distinguished authority come into the argument.

The illustrious Dr. Beddoes, in his "Hygeia," says:—

"Nor is it the sot's or drunkard's progress only that I delineate. Great multitudes come to the same misery with the drunkard and the sot, without ever numbering wine among the pleasures of existence, and who have always filled their glass scantily, in involuntary imitation of, or reluctant compliance with, their associates."

After which the same eminent writer continues to draw from his experience the results he has observed. He adds:—

"To pine in an uncertain, comfortless state, before falling into a well-marked disease, is not less frequent than to linger on a sick-bed before being permitted to enter the asylum of the grave. The drinker of too much wine commonly finds himself, what in medical phraseology is called cachectic, or, as some familiar writer terms it, I-don't-know-howish, for a long time before he is compelled to resort to the practitioner of medicine. However trifling his daily allowance, let him not flatter himself with the idea that it is impossible what he feels can be owing to so small a quantity."

"One of the first indications of mischief from wine taken constantly, in moderate quantity, when it may be supposed to act as an alterative, is a sense of dissatisfaction and being ill at ease some hours afterward. The young and sparing votary of Bacchus can not be expected to tremble all over on first rising, and to exhibit to every spectator, in a lack-lustre eye and cheerless morning visage, the effects of his afternoon libations."

"But what the veteran dram-drinker is unable to

conceal the other will be sensible of, in a proportionate degree, on self-examination. He will probably awake hot, restless, and heavy. The early sun will seem an intruder. He will shake off his drowsiness reluctantly, dress with languor, and be indifferent about food. The mouth will feel clammy, the stomach uneasy, till revived a little by the stimulant operation of tea or coffee. After stretching and yawning till the limbs are properly awake, he will eagerly close with any scheme which promises to raise emotions, or to relieve that listlessness, which dinner, and the circulation of the glass, are required completely to dissipate."

"In the course sometimes of a very few years there takes place general want of comfort, accompanied by a particular uneasiness about the region of the stomach, except shortly after that organ has been roused into temporary energy by more or less repletion. There is yet no severe or alarming symptom, though scarcely a day passes but the alimentary canal is sensibly out of order. These irksome sensations, however, come and go, and the person who experiences them can continue uninterruptedly his business, his studies, or his pleasures."

"It is now that vinous liquor begins to act as a two-edged sword. By its first operation it increases that indigestion, of which it has already so largely contributed to lay the foundation. Its second is little less pernicious to the enfeebled viscera. This depends on the change into vinegar, which wine, however genuine, undergoes."

"Vinegar taken frequently and freely we know to be destructive to the stomach. Indeed, were a person who is hourly reminded that he carries such a debilitated organ under his belt, to be offered ready-made vinegar, the idea would go near to bring on a fit of stomach-

cramp. Yet he may be assured that the wine he drinks not only attacks the coats of the stomach as wine, but that it afterward returns to the charge in an acidified form; and not only so, but it assists in turning sour the vegetable portion of the meat upon which it is poured."

"Indigestion establishes itself by degrees in full form. It is attended by loathing rejection of food, by constantly distressing flatulency, tremors, comfortless nights, emaciation, and decay of the intellectual faculties. A very great proportion even of the moderate drinkers of our stronger fermented liquors, experience some of these evils. Those whom the poet describes

"'Once fellow-rakes, perhaps, now rural friends,'

find that in place of being partners in pleasure, as in their better days, they have now only to condole with one another upon the torment of a bad stomach. In the worst dyspeptics, one or more glasses of wine will considerably relieve flatulence for the moment, and brandy still more effectually; for these violent stimulants rouse the muscular fibres into more vigorous action; the stomach contracts and expels the elastic fluids, in consequence of which the fulness is relieved. This temporary advantage, however, which seems to have introduced the pernicious custom of drinking wine repeatedly during dinner, is much more than compensated by the consequences even within a few hours, not to reckon the progressive injury to the structure of the digestive organs."

"Emaciation is peculiarly characteristic of the spirit-drinker. All drunkards, if they live long enough, become emaciated. The eyes get hollow, the cheeks fall in, and wrinkles soon furrow the countenance with the marks of age. The fat is absorbed from every part

The whole form becomes lank and debilitated. There is a want of due warmth, and the hand is usually covered with a chill, clammy perspiration."

"Drunkenness has a dreadful effect in anticipating the effects of age. Though some drunkards attain a green old age, they are few in number compared with those who sink untimely into the grave ere the days of their youth are well passed by."

PART II.

THE PARTICULAR INJURIES ARISING AND RESULTING FROM INTEMPERANCE.

DYSPEPSIA.

The dyspepsia from Alcohol is one of the first indications of its baneful action. The tongue is coated with a white fur; the appetite is capricious; the skin is often very hot, and then very cold; the action of the bowels is irregular, and is sometimes attended with constipation, at other times with relaxation.

The sleep is irregular, at times too heavy, at other times absent during natural hours of sleep. The mind is irritable, and the desire for the Alcohol grows upon the affected person until the poison seems to be an absolute necessity of life.

In those who are frequently under the influence of Alcohol, the external surface of the body is often affected. The skin becomes easily red and injected, assuming the appearance of a red rash. This condition shows a relaxed state of the blood-vessels, caused by the action of the alcoholic poison.

HEART AND BLOOD DISEASES.

The heart and other organs of the circulation are affected by the Alcohol functionally and organically. Whenever a distinct effect is made on the system by Alcohol the fact is indicated, at once, by the motions of the heart. The action of the heart is quickened for a considerable time, and then becomes enfeebled until another quantity of the poison is taken to revive it, a revival which soon becomes a pernicious habit of desire.

Persons habituated to Alcohol, therefore, all but invariably present an irregular state of the circulation, one moment a jaded, at another an excited circulation. In time this becomes the ordinary condition, supplemented by intermittent action of the heart, and by a persistent functional derangement which extends through the whole vascular system.

The muscular structure of the heart, owing to degenerative changes in its tissues, fails also under the influence of Alcohol. The elements of the muscular fibre are replaced by fatty cells, or if not so replaced are transformed into a modified muscular texture by which the power of contraction of the heart is greatly reduced.

It follows from these facts that the circulation, in all who indulge in Alcohol, is subjected to many extreme dangers. Even the functional derangements are not without danger unless all parts and organs of the body are in the most perfect balance and health. During organic derangement the danger is at all times great ; danger of sudden failure of the heart itself, of rupture of the blood-vessels, of effusion of blood into vital organs like the brain, with production of apoplexy ; or of effusion into other organs, such as the lungs or kidney, with interference of their function.

The blood is injuriously influenced by Alcohol. The

presence of Alcohol in the blood interferes with the due oxidation. The blood corpuscles are easily made to undergo changes by which they become irregular in shape, truncated, or shrunken and notched, or crenated, at their edges.

The plastic part of the blood is subjected to two modifications by Alcohol.

When the blood is feebly diluted with the poison the plastic part is rendered exceedingly fluid, so that the blood flows too easily from the vessels and injects the surfaces of the body, giving to the outer surfaces, like the skin, a mottled appearance, which, in cold weather, when the vessels are greatly relaxed, extends even to a general blueness or leaden color.

When the blood is strongly charged with Alcohol, the plastic part of it, instead of being rendered thin, may undergo coagulation, and by such coagulation may impede the course of the blood in its circulation through the finer vessels, or even through the heart itself.

Gout and rheumatism, usually considered as diseases of the blood, but much more probably allied to nervous derangement in regard to their primary origin, are both influenced greatly, though not produced exclusively, by Alcohol. Gout often owes, without doubt, its origin to indulgence in rich and luscious alcoholic drinks, the drink known as port wine being the most potent offender. Such drinks favor rheumatism as well as gout.

LUNG DISEASES.

From the paralyzing influence of Alcohol on the vessels of the minute circulation, the lungs, as will easily be inferred, soon begin to share in the accidents and degenerations which follow upon the disturbance of blood produced by alcoholic indulgence.

The sudden congestions of the lungs, which so fre-

quently occur in persons who indulge in Alcohol during severe winter seasons, are readily accounted for from this cause, and the long list of deaths which then characterizes our mortality table tells, too forcibly, the story of alcoholic devastation.

I observed many years ago that there was a peculiar form of consumption connected with indulgence in Alcohol, to which I gave the name of *alcoholic phthisis, or the consumption of drunkards.*

The disease usually occurs in persons over twenty-eight and under fifty-five years of age. These need not be charged with hereditary consumptive taint, though they may transmit the taint they have acquired. They are often considered as very healthy persons, who can endure anything, sit up late at night, and perform any amount of business. They may never have been drunk, but they are hard drinkers, and they bear drink with a tolerance that is surprising to lookers-on.

Of a sudden they break up with lung disease; they get pain in the side and pleurisy, followed by cough, vomiting of blood, rapid destruction of the lung, loss of flesh, and speedy death.

BRAIN AND NERVOUS DISEASES.

The nervous system shares largely in all derangements of the body produced by Alcohol, and, in fact, it never escapes some injury.

The nervous system suffers from various functional affections under alcoholic excitement and depression. It fails to receive correct impressions; it fails to send out correct commands; it fails to rest. Hence it is sometimes extra sensitive to vibrations set up within the body itself, and hears murmuring, ringing, or humming sounds, or sees shadows, and spots, and glintings which are not natural to it; or, blunted by excess, it is

oblivious of impressions to which it ought to be acutely alive.

The action of Alcohol is to keep the vessels of the brain relaxed, and no alcoholic sufferer is therefore a truly natural sleeper. He either lies restless, with the brain undergoing an unnatural activity, sleeping but for a moment and then waking again, or, taking an excessive dose of the poison, he produces a congestion of the brain and a torpor which is not sleep, but rather a modified apoplectic condition, interrupted by startings and deep snorings, and ending in a collapsed insensibility.

In both men and women, but in women especially, Alcohol leads to an hysterical condition, *Alcoholic Hysteria*. This disease is attended with great sensitiveness and irritability; noises and ringing sounds in the head; appearance of specks and spots before the eyes; flatulency, with sense of fulness in the throat; emotional excitement, from slight and varied causes, and uncertain action of the mind usually accompanied by reckless or feeble indecision of character.

Epilepsy from Alcohol is sometimes manifested, the disease assuming its most decided form and intensity, and proving, as a rule, fatal.

Apoplexy is another result from the same cause, and probably is a much more frequent result of alcoholic indulgence than is commonly supposed. The accident of rupture of a blood-vessel on the brain is doubly liable to happen on the diseased from Alcohol, firstly, because of the weakened state of the vessels, and, secondly, because of the pressure to which the vessels are subjected during periods of excitement from the poison.

But the most determinate nervous injury resulting from the use of Alcohol is *Paralysis*. When a person takes Alcohol for the first time to complete drunken-

ness, he passes through stages of moderate excitement, of extreme excitement, and of depression, into a state of temporary paralysis both of mind and body. His nervous system is overpowered by the Alcohol.

In like manner when men indulge for years in Alcohol, they pass through a series of long stages. At first the poison is to them a source of excitement; then of excitement with depression; next of depression altogether; and, finally, if they continue to indulge in it, of paralysis. Thus much of the general paralysis met with in our asylums is traceable to Alcohol as the cause.

Alcoholic paralysis develops itself in two forms. In some instances it is local, affecting one limb or one side of the body, and not immediately interfering with the mental powers. In other instances it commences with a long stage of muscular feebleness, passes into mental alienation, and finally into a loss of all power of will. The muscles retain some irritability, but the will fails to control them—general paralysis.

DIPSOMANIA AND CRAVING FOR ALCOHOL.

A distinct form of disease, produced by the poisonous action of Alcohol, is that of craving for the poison until the craving becomes a form of mania.

Dipsomania assumes two forms. One, the intermittent, where the craving propensity comes on at intervals of time; the other, the continuous, in which the craving never actually ceases. Recovery from both forms is possible, during the early stages, under entire abstinence from the cause; but, as, in the great run of cases, entire abstinence is not carried out, the common end is toward nervous degeneration, and mental and physical death.

DELIRIUM TREMENS.

The disease known as delirium tremens is that most intimately connected in the public mind with Alcohol as the producing agent. It is an acute delirium brought on by direct excess of Alcohol.

The delirium presents various phases. Sometimes it is violent, passionate, ecstatic; at other times, low, muttering, and wandering.

Through all there is one marked symptom, from which the disease takes part of its name, *tremor*, an uncontrolled action of the muscles, increased by any external irritation.

The disease continues so long as the poison is supplied, and is so often fatal that it yields a calculable mortality registered from week to week in the returns of mortality. After recovery from delirium tremens the body is left enfeebled, and the tissues prone to degenerative changes.

[*In illustrating this part, the Teacher may refer, with much advantage, to Dr. Norman Kerr's recent Paper on "Alcohol and Disease."*]

PART III.

PRACTICAL INFERENCES.

The practical inferences derivable from the above-named facts are perfectly clear and unmistakable. They may be expressed in two or three short sentences.

1. An agent which possesses the power of producing such extensive devastation in the human body as Alcohol does, must, of necessity, be fatally injurious in the hands of the thoughtless and careless multitude.

2. An agent which possesses the property of injuring every organ is certain to inflict injury on that organ which in any person is most susceptible to disease.
3. It is common-sense itself to avoid being subjected to the risks attendant on the habitual use of so subtle and dangerous an enemy.

SUBJECT IX.

ALCOHOL AND THE NATIONAL LIFE.

INTRODUCTION.

In this Subject it is proposed to consider some points in relation to the influence of Alcohol on the national life and health.

A very simple problem lies before us. The sum of one hundred and seventeen millions sterling is invested in this country in Alcohol as a commercial substance. What does the Alcohol do?

We know that the larger part of it goes for consumption by human beings. A little is used for purposes of art and science, but the greater portion of it, practically all but the whole of it, is consumed by human beings.

In old days upon entering a large town or city, the traveller would see four great sullen gateways piercing the walls, and flanked with heavy towers.

Those gateways are gone now, but there are still four conspicuous buildings to be seen. These are:—

The house for the reception of the insane, the Asylum.

The house for the reception of the indigent poor, the Work-house.

The house for the reception of the criminal classes, the Jail.

The house for the reception of the sick, the Hospital.

The national expenditure on Alcohol is very great. Does the expenditure increase or lessen the necessity for the Asylum, the Work-house, the Jail, the Hospital?

This is the question before us at the present moment.

Explain that the Subject will be divided into four parts.

- I. Insanity in relation to Alcohol.
- II. Pauperism in relation to Alcohol.
- III. Crime in relation to Alcohol.
- IV. Disease in relation to Alcohol.

PART I.

INSANITY IN RELATION TO ALCOHOL.

Alcohol, amongst those who indulge largely in it, produces several diseased conditions of mind.

Some of its effects are to cause premature loss of memory, failure of mental capacity, loss of motion, and loss of speech.

Aristotle says, "Animals have a voice ; man speaks."

In the worst cases of mental failure from Alcohol the voice of the man remains, but the speech is lost. Man thus sinks to the lower rank of the living creation over which he was born to rule.

Men and women in this helpless state are often said to suffer from *general paralysis*.

Our Asylums contain an immense number of examples of this general paralysis produced by Alcohol.

Alcohol produces another form of mental aberration, in which there is incessant craving for itself; a true disease; a mixed madness and craving, in which cunning is combined with the vices that ally themselves to it.

In this state all the principles of honor, integrity, and truth are lost, and the end is commonly a complete failure of mental and physical power.

We call the victims of this part of the nation dipsomaniacs.

The effect of Alcohol in causing disease of the mind is shown in another class.

There are large numbers in the nation who are intemperate at intervals, who are subject to what is called intermittent indulgence.

These are not habitual drunkards, but are persons who at sudden intervals madden themselves with drink ; then repent ; then reform ; then get a new lease of life ; then relapse.

In their intervals of madness these persons are the terrible members of the community. They spread around their circle the desolation of fear and dread and despair. Their very footsteps carry dread to those who, most helpless and innocent, are under their control.

These become the dangerous alcoholic criminals of the nation.

The doctors, in their language, describe them as sufferers from *mania a potu*, mania from drink.

Much difference of opinion is expressed as to the number of the insane who have been brought to insanity through Alcohol.

The Commissioners in Lunacy in this country calculate that alcoholic indulgence yields fourteen per cent. of the insane.

Dr Edgar Sheppard, who for many years was Medical Superintendent of Colney Hatch Asylum, calculated that forty per cent. of the inmates admitted into that Institution were brought into their condition by the direct or indirect action of Alcohol.

On resigning his appointment, upon retirement, Dr. Sheppard repeated this estimate in his last report.

The most solemn fact of all bearing upon the mental aberrations produced by Alcohol, is that the mischief inflicted by man on himself is apt to be transmitted to those who descend from him.

This the physician calls the hereditary effect of Alcohol.

How seriously the heredity extends is shown by Dr. Mason in the following statistics collected in his Home for Inebriates:—

Family history of 116 cases of inebriety: Inebriate fathers, 92; mothers, 2; fathers *and* mothers, 4; father *and* brother, 1; father *and* sister, 1; brothers, 2; grandfathers, 6; grandparents, 1; relatives (uncles), 7.

Insanity of parents should be regarded as one of the predisposing causes to inebriety in their children. But the principal hereditary cause of inebriety is an inebriate father or mother; especially, as these records show, an inebriate father.

PART II.

PAUPERISM IN RELATION TO ALCOHOL.

It is admitted on all hands that one of the greatest causes of the poverty of the country is due to indulgence in Alcohol.

Statistical facts on this subject are less reliable than would be expected, owing, not to deficiency of facts, for there is abundance of them, but to the difficulty of separating them from various surrounding circumstances with which they are often intimately connected.

Thus the circumstance that a man or woman is brought to seek parish relief is often sufficient, for pity's sake alone, to prevent the fact of Alcohol being recorded as the cause.

How far the influence of intemperance tells upon labor was exceedingly well expressed in the report of a Parliamentary Committee of 1834.

The reporters made the following note :—

“ The loss of productive labor in every department of occupation, is to the extent of at least one day in six throughout the kingdom (as testified by witnesses engaged in various manufacturing operations), by which the wealth of the country, created, as it is, chiefly by labor, is retarded or suppressed to the extent of one million of every six that is produced, to say nothing of the constant derangement, imperfection, and destruction in every agricultural and manufacturing process, occasioned by the intemperance and consequent unskillfulness, inattention, and neglect of those affected by intoxication, and producing great injury in our domestic and foreign trade.”

The same reporters showed how intemperance pauperized by its general influence on the national welfare.

They affirmed :—

“ That in a national point of view, as affecting the wealth, resources, strength, honor, and prosperity of the country, the consequences of intoxication and intemperate habits among the people are as destructive of the general welfare of a community as they are fatal to the happiness of individuals. Among others, the following evils may be distinctly traced :—

“ The destruction of an immense amount of wholesome and nutritious grain, given by a bountiful Providence for the food of man, which is now converted by distillation into a poison.”

The highest medical authorities, examined in great numbers before the Committee, were all but uniform in their testimony :—

“ That ardent spirits are absolutely poisonous to the human constitution ; that in no case whatever are they necessary or even useful to persons in health.

“ That they are always, in every case, and to the smallest extent, deleterious, pernicious, or destructive, according to the proportions in which they are taken into the system.” It is further asserted by the reporters :—

“ That not only is an immense amount of human food destroyed, whilst thousands are inadequately fed, but this food is destroyed in such a manner as to injure greatly the agricultural producers themselves, for whose grain, but for this perverted and mistaken use of it, there would be more than twice the present demand, for the use of the now scantily-fed people, who would then have healthy appetites to consume, and improved means to purchase, nutriment for themselves and children in grain, as well as in all the other varied productions of the earth.”

[*The Teacher may here offer many illustrations from different independent authorities, and especially from the valuable papers of Mr. Wm. Hoyle.*]

PART III.

CRIME IN RELATION TO ALCOHOL.

Nothing is more definite than the fact that Alcohol encourages and sustains the commission of crimes.

It has been the verdict of history, that crimes of the worst kind and the use of strong drink have always gone together.

This also is the opinion given by the most distinguished of our judges, one of whom has asserted that as many as nine-tenths of crimes of violence are due to Alcohol.

In the report on drunkenness presented to the House of Commons in 1834, the evidence of Mr. John Poynder, for thirty years clerk to the two Hospitals of Bridewell and Bethlem, is, perhaps, the most important ever recorded on the subject of crime begotten by Alcohol.

Mr. Poynder showed from his direct experience, that Alcohol fostered the following criminal acts:—

1. *Theft*.—Because the habit of drinking being expensive, if a man himself have not the means of gratifying it, he is led to resort to the substance of his neighbor for a supply.

2. *Violent and atrocious crimes*.—Because the criminal, rendered insensible to the milder feelings of his nature, is ripe for sanguinary and ferocious acts.

“Nearly all the convicts for murder with whom I have conversed,” says this witness, “have admitted themselves to have been under the influence of spirits at the time of the act.”

3. *Breaches of trust and perpetual violations of confidence*.—Because the necessity of the supply of liquor led to first temptation, and when once the first barrier between honesty and fraud is passed, all afterward is easy and without repugnance until detection ensues.

“Most of the cases of embezzlement which I have known in my official capacity,” adds Mr. Poynder, “were referable to drink.”

4. *Youthful depravity*.—Because the habits and customs of relatives and friends with regard to drinking

are such that the children of drinkers can not but be depraved. Fathers and mothers who have themselves lost the habits of domestic life, can neither value nor preserve those habits in their children.

5. *Insubordination and sedition*.—Because disaffection and discontent—the most fertile sources of contempt for human law as well as divine—are found in the drinking of spirits. The mind is soured and irritated in consequence of perpetual excitement; it is ill at ease in itself, and vents its resentment upon all around.

“I feel strongly persuaded,” says Mr. Poynder, in reference to the system of drinking, “that the Government loses infinitely more in the alienation of the minds of its people than it can ever gain by the largest contribution to its revenue.”

“The effect of liquor upon the Irish in every scene of depredation and murder needs only to be adverted to.”

“The morning dram-shop and the evening public house are well calculated to form and cultivate such a state of mind.”

6. *Tendency to harden the heart and extinguish the natural affections*.—Because it (drink) engenders selfishness and unkindness to an extraordinary degree.

Many men are rendered by it brutal toward their wives, and defraud their wives and children of the money that should be spent on their necessary subsistence.

7. *Hatred of labor and abuse of time*.—Because by the vice of drinking, men are constantly led to pass the first two or three days of the week in the public house spend their money there, and return to honest labor with disgust for it.

PART IV.

DISEASE IN RELATION TO ALCOHOL.

Mr. Poynder summed up with great ability the action of Alcohol in producing disease in his day.

He observed specially the following facts:—

“The children of dram-drinkers are generally of diminutive size, of unhealthy appearance and sickly constitution.

“In adults the vice of drinking is peculiarly destructive in its operation.

“It deranges the animal economy.

“It weakens the nerves.

“It destroys the digestive powers.

“It obstructs the secretions.

“It destroys the life.

“Depression of spirits almost invariably accompanies drinking, while the effect produced by every fresh stimulus is only to excite temporary action, which, when it has ceased, leaves the same languor and depression to be again removed by the same destructive means.

“Almost all attacks of fever or inflammatory diseases are found fatal in the case of dram-drinkers, because the blood of such persons is remarkably destitute of oxygen, and therefore can afford little or no antiseptic resistance to such diseases.

“In some cases dropsy and consumption, in others paralysis and apoplexy, are evident consequences.

“Premature old age is observed in most instances, and a miserable existence in all.”

To this evidence of Mr. Poynder, the Committee itself added the following epitome of evils resulting from Alcohol:—

“The diminution of the physical power and longevity

of a large portion of the British population, by the destructive effects already described, as produced on individuals. The loss of personal beauty, the decline of health, and the progressive decay of the bodily and mental powers, evils which are accumulative in the amount of injury they inflict, as intemperate parents, according to high medical testimony, give a taint to their offspring, even before its birth. The poisonous stream of ardent spirits is conveyed through the milk of the mother to the infant at the breast, and the fountain of life, through which nature supplies the pure and healthy nutriment of infancy, is poisoned at its very source. Thus a diseased and vitiated appetite is created, which grows with growth, and strengthens with increasing weakness and decay."

The same lines of evidence extend to our own time.

The author of these notes has shown in his table on occupations and mortality that compared with an annual mean death-rate per thousand in England and Wales, of males aged fifteen and upward, engaged in seventy occupations, in the three years 1861, 1862, and 1871, the deaths of those who were engaged in the occupation of selling alcoholic drinks, namely, inn and hotel keepers, licensed victuallers, and publicans, were as a hundred and thirty-eight to one hundred of the mean of the other occupations.

Dr. Ridge has directed attention to the fact that if we contrast the health of abstaining soldiers with that of soldiers who take alcoholic drinks, the most favorable position is discovered for the abstaining classes. For example:—

From the Annual Report of the Soldiers' Total Abstinence Association for 1879-80, p. 16, we find that there are now more than nine thousand abstaining soldiers in India, and that several regiments have sent in

returns as to the relative sickness and mortality among two thousand one hundred and eighteen abstainers, and four thousand four hundred and thirty non-abstainers.

From these returns we learn that of the non-abstainers the monthly averages per thousand were (1) Admission into Hospital, 93; (2) Invalided to the Hills, 8.7; (3) Invalided to England, 5.27; (4) Deaths per thousand, 1.45.

Of the abstainers the monthly averages per thousand were (1) Admission into Hospital, 48; (2) Invalided to the Hills, 3.9; Invalided to England, 1.27; (4) Deaths per thousand, .375.

The latest returns bearing upon this subject are those collected by a Committee of the Harveian Society of London.

The researches of this Committee have shown the large preponderance of mortality in those persons who are engaged in the Liquor Trade as compared with persons following other occupations.

"Out of 224 deaths of persons dependent for their living upon various trades, no less than 104 appear to be publicans, hotel-keepers, wine merchants, their wives and persons in their employ."

"From an analysis of ten thousand cases of death returned to the Committee as occurring in London from different causes, as nearly as possible fourteen per cent. were instances in the causation of which Alcohol appears to have played some part."

"If," say the Committee, "this part were in all cases a leading one, it would correspond to an annual adult mortality of about five thousand eight hundred and seventy from Alcohol in London, or thirty-eight thousand nine hundred and seventy-one for England and Wales, assuming for the moment that the Metropolitan figures would apply to the whole country."

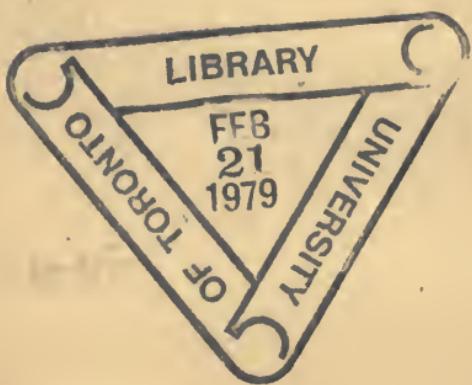
CONCLUSION.

But one conclusion can be arrived at from the facts and figures which have been before us in this Lecture, namely:—

That where Alcohol reigns, health, wealth, peace, happiness, can have no free development, and that the masses reigned over are masses enslaved.







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